STS-109

*2961786 *

PROCESSING OPERATIONS CONTROL
OMI PLANNING SHEET

Wad Number	SITE	Elem CD	End Item	
S6444-J03-R01	PAD-A FR	V	102 FLT: 027	DATE: 02/08/2002 TIME: 13:47:30

Title: SSV ICE AND DEBRIS ASSESSMENT

Sub Element/Zone: 30

Project Work Order No.	Hazard:	SFOC Safety	
	☒ Yes ☐ No	N/A WC 150 USA FEB 8 '02	☐ Local Copy ☒ Firing Room Copy

Authorizing Document	Material & Equipment:	MICR Req'd	OMRS:
ORB227-688(ADD)	☒ Yes ☐ No	☐ Yes ☒ No	☒ Yes ☐ No

PERFORM THE FOLLOWING:

Pre-Ops Setups

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

SPC 380

L 8 '02

CVAS	TIPS	ME	TACCS
USA VM 050	N/A USA VM 034	USA VM 072 / USA VM 093	USA VM 040

OPS Support

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

Operating Instructions

Task	Seq	Steps	Task	Seq	Steps
	010			080	
	015			090	
	020			100	
	030			110	
	040			120	
	050			130	
	060			140	
	070			145	

Post Ops

Task	Operation Number	Seq	Steps

Appendices

Task	Seq
N/A	

Subtask WAD's

N/A

Planner	Ext	QC Closure	Date	Page
LISA RUTKOWSKI WC 150 US FEB 8 '02	0746		SPC 764	1 OF 2

*2961786 *

PROCESSING OPERATIONS CONTROL
OMI PLANNING SHEET

Wad Number	SITE	Elem CD	End Item	
S6444-J03-R01	PAD-A FR	V	102 FLT: 027	DATE: 02/08/2002 TIME: 13:47:30

Title:	Sub Element/Zone
SSV ICE AND DEBRIS ASSESSMENT	30

Project Work Order No.	Hazard:	SFOC Safety	
	☒ Yes ☐ No	N/A WC 150 USA FEB 8 '02	☐ Local Copy ☒ Firing Room Copy

Authorizing Document	Material & Equipment:	MICR Req'd	OMRS:
ORB227-688(ADD)	☒ Yes ☐ No	☐ Yes ☐ No	☒ Yes ☐ No

PERFORM THE FOLLOWING:

Pre-Ops Setups

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

OPS Support

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

Operating Instructions

Task	Seq	Steps	Task	Seq	Steps
	150				

Post Ops

Task	Operation Number	Seq	Steps

Appendices

Task	Seq
N/A	

Subtask WAD's

Planner		Ext	QC Closure	Date	Page
LISA RUTKOWSKI	WC 150 USA FEB 8 '02	0746	SPC 764	JUL 9 '02	2 OF 2

OMI TASK CLOSEOUT CHECKLIST

OMI No.	Run No.	Task Control No. (TCN)
S6444 J-03	1	2961786
Start Date	**Completion Date**	**Closure Date**
FEB 08 2002	JUNE 4TH 2002	BPO 764 JUL 8 '02

		QC/Eng.	Date
1.	Deviation Index: Verify total number of deviations agree with index. Verify entry is correct into OMI.	FOR ETOS OR 04	6-4-02
2.	Constraints List: Verify all constraints are accepted by QC or waivered by Engineering. Verify that constraints list is complete and closed. NO O.I.R. REQ'D	FOR ETOS OR 04	6-4-02
3.	IPR's: Verify that all IPR's are closed or upgraded to problem reports or dispositioned as no constraint to OMI closure and incorporated in central IPR system and a copy of the central IPR sort attached.	BPO 968	JUN 13 02
4.	Verify that material and equipment requirement list enclosed (if applicable).	N/A	N/A
5.	OMI: Verify that all pages or verification sheets are completed, stamped, and dated in the lower left/right hand corners.	FOR ETOS OR 04	6-4-02
6.	OMI: Verify that all miscellaneous documents/procedures have sequence number referenced and stamped; e.g., photos, sample results, etc.	FOR ETOS OR 04	6-4-02
7.	Planned task/OMI satisfactorily completed. OBR: TONY CAMPBELL FOR RAY BREWER PER TELECON FOR CLOSURE 06-4-02 (06-04-02 OR 04)	OR 04 FOR RAY BREWER	6-4-02
8.	LSS review prior to closure for CIL OMI's. MMC N/A Thiokol N/A		

01-09-2002
APPROVED

OMI S6444 J03
APPROVED

SSV ICE AND DEBRIS ASSESSMENT

Element/End Item: **ALL**
Flow/Usage: **ET-103 & SUBS**
Facility: **LC 39**
Design Center Concurrence: **MSFC/JSC**
Category: **B**
OPR: **ETM**
TTL ORG: **SE**

This document contains HAZARDOUS operations.

KENNEDY SPACE CENTER - SPACE TRANSPORTATION SYSTEM

Table of Contents:

1.0 INFORMATION

1.1 Objective

Provide necessary tasks that document, monitor and evaluate ice and debris conditions to eliminate or minimize debris concerns of the integrated SSV during ET tanking, FRF, launch, and associated detanking.

Description

1. This OMI is performed as subtask to S0007/S0014/S0037.
2. This OMI provides documentation of ice/debris activities:
   A. Pre-launch icing briefing
   B. Pre-launch debris inspection
   C. Countdown - Based timeline evaluation monitoring of ET TPS surfaces using OTV
   D. OTV monitoring of seal/flange areas for cryogenic leakage
   E. SSV OTV monitoring for debris conditions during countdown
   F. Cryogenic replenish inspection for evaluation of SSV and facility debris concerns or anomalies
   G. Evaluation of concerns/anomalies in the event of ET detanking
   H. Review of engineering film data for SSME ignition, launch, ascent, ET separation, and orbiter landing.
3. Orbiter landing debris information is contained in the NASA publication for Ice and Debris Assessment. That report is referenced in this OMI for continuity of debris data.

1.2 Special Instructions All Operations

1. This OMI is run as a subtask to OMI's S0007, S0014, and S0037. All PAD clearing and controlled access operations will be performed per those OMI's.

2. Constraints will be statused by controlling OMI's S0007/S0014/S0037.

3. The OTV camera numbering scheme for PAD A/B is 0XX/1XX.

4. Task Team Leader assignment: NASA PH-H is TTL for L-20 Hour Walkdown, Final Inspection, and Post Launch/Drain Walkdown. ETM is TTL for all other operations.

5. From time stable replenish mode starts until start of final SCAN, scanning with individual cameras should be performed approximately once per hour.

6. Cameras 061/161, 063/163, and 070/170 may be released to NASA select with CICE concurrence.

7. All personnel participating in final inspection and post drain walkdown shall be current in following training:

   A. Emergency PAD egress

   B. Fire fighting

   C. ELSA

8. Milestones:

   A. MLP portion of post launch walkdown commences at approximately T + 1 hours.

   B. PAD acreage portion of the post launch walkdown commences at approximately T + 2 hours. (may be deferred until preferred daylight hours.)

   C. Post drain walkdown commences at approximately T + 4 hours after drain initiated (typically 1 1/2 hours after LH_2/LO_2 low level sensors dry).

9. Hands-on investigation required for all ET-TPS defects suspected of violating NSTS 08303 ice/debris inspection criteria.

10. From time launch scrub is declared until 1.5 hours past time LH_2/LO_2 low level sensors read dry, OTV camera scanning shall be performed approximately once per hour.

11. OTV cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171 shall be used to monitor LO_2/LH_2 tank drain operations.

12. Excessive vapors are defined as being more severe than that described in NSTS 08303 - Ice/Debris Inspection Criteria or NSTS 16007 - Launch Commit Criteria - Hazardous Gas Subsystem.

13. Quality coverage is not required for performance of this OMI. Ref SFOC-GO0007, Ice and Debris Team Operations are exempt from quality coverage. The ROR (CTIF) performs the CMQC function for all non-hazardous operations.

14. Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in the bayonet fitting and the lithium button battery door is securely locked and taped in place.

15. Verify camera flash is deactivated.

16. Personnel using Kodak DC 50/120 camera shall verify alkaline batteries are properly installed.

17. Personnel using digital cameras shall not operate in H_2 leak or O_2 rich environment (23 percent or greater).

18. Personnel using the Sony MVC-FD91 camera shall verify the lithium ion battery is securely locked and the battery door is locked closed. Personnel shall verify that both battery doors (lithium ion and lithium button) are closed and taped shut.

19. Personnel shall verify that cameras and equipment are securely tethered when at the PAD while the SSV is present.

1.3 Operations List

Operation		Shop/ Cntl Rm Console	OPR	Haz (Y/N)	Duration (Hrs)
No.	Title				
10	Support Preparations	STM/ FR2	ETM	N	0.2
15	IR Camera Setup	PH-H/ NA	ETM	N	4.0
20	Ice Prediction Briefing	SE/ NA	ETM	N	0.5
30	Pre-launch Walkdown	SE/ NA	ETM	N	2.0
40	Ice Frost Debris Console Initial Configuration Setup	SE/ FR2	ETM	N	3.0
50	SSV Debris Assessment	SE/ FR2	ETM	N	18.0
60	Group 1 Monitoring LO2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
70	Group 2 Monitoring - LH2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
80	Final Inspection	SE/ FR2	ETM	Y	3.0
90	LO2/LH2 Drain Monitoring	SE/ FR2	ETM	N	4.0
100	Console Securing	SE/ FR2	ETM	N	0.5
110	Summary Tape	SE/ FR2	ETM	N	18.0
120	Post Drain Walkdown	SE/ NA	ETM	Y	2.0
130	Post Launch Walkdown	SE/ NA	ETM	Y	3.0
140	Film Review	SE/ NA	ETM	N	15.0
145	IR Camera Removal	PH-H/ NA	ETM	N	2.0
150	Final Report	SE/ NA	ETM	N	0.5

2.0 SAFETY INFORMATION

2.1 Hazards

Operation
1. Working at unprotected heights.
2. Walkdown at PAD while SSV is in stable replenish mode.

2.2 Safety Requirements

Operation
1. If lightning activity is forecast to be within 5 miles of launch PAD, CTC and SFOC safety shall implement provisions of adverse/severe weather and lightning policy contained in GSOP 5400 Ground Safety Operations Procedures.
2. There are no safing/shutdown or evacuation steps required in this OMI.
3. Hazardous operations within this subtask OMI will not be started until safety concurrence to proceed has been given per the integrated OMI controlling this subtask.

2.4 Reference Safety Documentation

Number	Rev	Title
KHB 1710.2	LI	KSC Safety Practices Handbook
GSOP 5400	LI	Ground Safety Operating Procedures

3.0 STAGING REQUIREMENTS

3.1 Referenced Engineering Documentation

3.1.2 Documents

OPERATION 120

Document No.	Rev	Title
NSTS 08303	(LI)	NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA

3.2 Parts, Materials, Equipment, and Special Tools

3.2.5 Shop Support Materials

OPERATION 15

Part No./Find No.	Nomenclature	Qty	Unit
8305-00-519-3144	Rymple cloth	2	roll
6810-00-543-7915	Isopropyl alcohol	8	ounces

OPERATION 145

Part No./Find No.	Nomenclature	Qty	Unit
8305-00-519-3144	Rymple cloth	2	roll
6810-00-543-7915	Isopropyl alcohol	8	ounces
6505-00-133-8025	Petroleum Jelly, Vaseline (or equivalent)	1	tube/jar

3.2.8 Personal Protective Equipment

OPERATION 15	**Nomenclature**
	N-Dex nitril gloves
	chemical splash goggles
	face shield
OPERATION 30	**Nomenclature**
	safety harness
	lanyard
OPERATION 80	**Nomenclature**
	safety harness
	lanyard
	Nomex coveralls with gloves and hoods
	ELSA
OPERATION 120	**Nomenclature**
	safety harness
	lanyard
	hardhats
	flame retardant coveralls
OPERATION 130	**Nomenclature**
	safety harness
	lanyard
	hardhats
	flame retardant coveralls
OPERATION 145	**Nomenclature**
	N-Dex nitril gloves
	chemical splash goggles
	face shield

4.0 PLANNING REQUIREMENTS

OIR Required Yes [ ], No [X]

4.3 LPS Requirements

4.3.1 Computer Systems

PC GOAL
CCMS Configuration
CDS
CMS

4.4 Support Services, Commodities, and Equipment

4.4.2 Communications

(Per controlling OMI S0007, S0014 or S0037 unless specified otherwise)

4.4.3 OTV

(Per controlling OMI S0007, S0014 or S0037 unless specified otherwise)

OTV Cameras required: 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

OTV Cameras to be recorded: 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

4.4.4 Countdown Display/Status

Display Required	Bldg	Room	Operation Time
Timing	LCC	FR2	Duration of Test
Countdown and GMT	LCC	FR2	Duration of Test

4.4.8 Services

Service/Special Requirements	Location	Purpose
SFOC Safety	LC-39 A&B	Safety Support
ELSA'S (8)	LC-39 A&B	Inspection Team Use
Radio Net 105	LC-39 A&B	Inspection Team Use

4.4.12 Propellants, Gases and Chemicals

Commodity	Spec No.	Quantity	Rcvr	Location	Minimum Press	Delivery Time
GN_2	SES-0073 -6.3-5	Min 750 Cu ft	PH-H 861-3645	Pad 39B Camera Site 2	3000 PSI	1 week prior to T-0

5.0 CONFIGURATION ACCOUNTING AND VERIFICATION

5.1 Specific OMRS Requirements Satisfied by this TOP

OMRS NO.	NOMENCLATURE/ EFFECTIVITY	SEQ-STEP (CAP)
S00E00.021	ET TPS MON DURING DETANK TAF;C	90-005
S00E00.031	POST DETANK ET TPS INSPECT TAF;C	120-002
S00FA0.900	PRELAUNCH WEATHER BRIEFING (L-1 DAY) VAF1-90	20-001
S00FB0.005 (1)	ET TPS SURFACE MONITORING T23,27-29,31-999	50-023
S00FB0.350 (1)	MONITOR GO2 VENT HOOD VAF1-90	50-025
S00FB0.360 (1)	MONITOR ET/ORB MPS FOR LEAKAGE VAF1-90	50-023
S00L00.150	HIGH WIND ET NOSE INSPECTION SAF;C	50-021
S00U00.010 (1)	POST LAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	130-002
S00U00.011 (1)	ENGR REVIEW & ANALYSIS OF LAUNCH FILM SAF1-999	140-001
S00U00.020-A (1)	AN ENGINEERING PAD INSPECTION TEAM SAF1-999	80-002
S00U00.020-C (1)	INSPECT ORBITER AFT ENGINE SAF1-999	80-002
S00U00.020-D (1)	INFRARED SURVEILLANCE SAF1-999	80-002
S00U00.030 (1)	PRELAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	30-001

5.5 List of References

OPERATION 20

Reference No.	Rev	Title
NSTS 16007	(LI)	NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F

OPERATION 30

Reference No.	Rev	Title
80901019010	(LI)	ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

OPERATION 40

Reference No.	Rev	Title
79K24576	(LI)	OTV System Installation, LC 39, Pad A
79K24522	(LI)	OTV System Installation, LC 39, Pad B

OPERATION 50

Reference No.	Rev	Title
SPI SP-519	(LI)	OMI and OM Implementation
SFOC GO0007	(LI)	Quality Planning Requirements Document (QPRD)

OPERATION 10 Support Preparations

Shop: **STM**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **0.2**

~~10-1~~ **STM JYVO 138**

Verify PAD OTV system is configured to support S6444 as scheduled.

Support: COMM

~~10-2~~ **STM JSTC 111**
JSTC *SCB 114

Verify eight 10-minute ELSA's available at complex J for use by Final Inspection Team (ref S0007/S0014/S0037).

Support: LS

~~10-3~~ **STM TBC 136**

Operation - Support Preparations complete.

*** End of Operation **10** ***

2-28-02
ET 05

OPERATION 15 IR Camera Setup

Shop: **PH-H**
Cntrl Rm Console: **NA**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **4.0**

WARNING

Hard hats required on the Pad when SSV is not present.

CAUTION

Exercise care to avoid dropping equipment, fasteners, etc from RSS Roof to prevent damage to equipment or injury to personnel. All tools must be tethered.

NOTE

IR Camera installation at RSS Roof site may be not performed if IR Camera already installed or if technical concerns preclude such.

15-1 **Install** IR camera at RSS Roof Site as follows.

1. **Rotate** camera housing back cover to open position by removing bolts with flat washers (20 pl). **Retain** bolts/washers for reinstallation.

2. **Remove** camera housing front cover by removing fasteners (2 pl). **Reinstall** fasteners after cover removal. **Retain** cover for reinstallation after IR Camera Unit removal.

3. **Install** IR Camera Unit into camera housing. **Secure** IR Camera Unit in housing by locking spring pin at lower, left.

2-28-02
ET 05

WARNING

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

CAUTION

Do NOT allow opened back cover to exert undue force on cables once cables have been connected.

4. **Connect:**
   - OTV coaxial cable
   - Pan & tilt cable
   - Controller cable
   - Power cable

5. **Rotate** camera housing back cover into closed position. **Secure** back cover by installing bolts/flat washers (20 pl). **Tighten** bolts wrench tight.

2-28-02
ET
05

WARNING

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

6. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol .

7. **Perform** functional checkout of IR Camera Unit using local controller if required at Task Team Leader (TTL) discretion.

Sub Step Not Performed: ~~N/A~~ #7 YES (1)

NASA PH-H2 [signature] Date 2-25-02

USA ETM RBrewer Date 2-25-02

Not Performed: N/A

(1) Substep No. 7 was performed- ET 05 6-28-02

2-28-02 ET 05

NOTE

IR Camera installation at Camera Site 2 may be not performed if IR Camera already installed or if technical concerns preclude such.

15-2 **Install** IR camera at Camera Site 2 as follows.

1. **Rotate** camera housing back cover to open position by removing eight ea bolts using Phillips screwdriver. **Retain** bolts/washers for reinstallation.

2. **Remove** camera housing front cover by removing securing bolt(s). **Reinstall** bolt(s) after cover removal. **Retain** cover for reinstallation after IR Camera Unit removal.

3. **Install** IR Camera Unit into camera housing. **Secure** IR Camera Unit in housing by tightening set screw(s) wrench tight at lower left/right.

WARNING

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

4. **Connect:**
   - OTV coaxial cable
   - Pan & tilt cable
   - Controller cable (2 pl)
   - Power cable

5. **Rotate** camera housing back cover into closed position. **Secure** back cover by installing bolts (8 pl). **Tighten** bolts using Phillips screwdriver.

2-28-02
ET 05

WARNING

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

6. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol .

7. **Perform** functional checkout of IR Camera Unit using local controller if required at Task Team Leader (TTL) discretion.

#1 YES (1)

Sub Step Not Performed: ~~N/A~~

NASA PH-H2 [signature] Date 2-25-02

USA ETM R Brewer Date 2-25-02

Not Performed: N/A

*** End of Operation **15** ***

(1) Substep No. 7 was performed - 6-28-02 ET 05

2-28-02 ET 05

01-09-2002
APPROVED

OMI S6444 J03
APPROVED

OPERATION 20 Ice Prediction Briefing

Shop: SE
Cntrl Rm Console: NA
OPR: ETM
Zone: NA
Hazard (Y/N): N
Duration (Hrs): 0.5

NOTE
Ref: NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F defines the ET No-Ice Zone.

20-1 **CICE**

Conduct L-1 day ice prediction briefing with launch director.

PH-H Signature _____ PH-H2 2-28-02

OMRSD S00FA0.900 USA 011

20-2 Operation - Ice Prediction Briefing complete.

*** End of Operation **20** ***

ET 05
2-28-02

OPERATION 30 Pre-launch Walkdown

Shop: **SE**
Cntrl Rm Console: **NA**
OPR: **ETM**
Zone: **PAD**
Hazard (Y/N): **N**
Duration (Hrs): **2.0**

WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a safety harness with a lanyard secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

NOTE

This operation is performed at approximately L-20 hours. When this operation is performed in support of a 24 hour scrub turnaround, the preceding launch scrub post drain walkdown and this pre-launch walkdown may be performed concurrently.

Inspections may also be performed from the RSS, GO_2 Vent Arm (GVA), -Y OWP, or +Y OWP if still extended and accessible.

Ref: 80901019010 (LI) ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are optional walkdown participants.

NASA Engr	(4)
SFOC Engr	(2)
LMSSC - LSS	(1)
Boeing - LSS	(1)
SRB ELE	(1)
Thiokol - LSS	(1)

30-1 Debris inspection team **perform** walkdown of SSV and MLP per following:

1. Team leader **verify** S6444 pre-test briefing complete.

2. **Assemble** following essential personnel

   NASA PH-H Engineering - 1
   SFOC ETM Engineering - 1

3. **Inspect** following areas (as a minimum) from the MLP, RSS and FSS to identify/ resolve potential debris sources.

   Areas to be inspected

   A. Launch vehicle external surfaces

      - Orbiter
      - SRB's
      - External Tank

   B. MLP surfaces

      - LH and RH SRB holddown posts
      - Deck including deck bolts, fixtures, and edge gutters
      - SSME LH and RH SRB exhaust openings, and sound suppression (S$) troughs
      - TSM's and camera housings

4. Ref Table 30-1, **document** and SIM Photograph SSV and Launch PAD Configuration.

   Description: Pre launch walkdown

   OMRSD S00U00.030-1

WC 140 USA FEB 28 '02 Dev. GC N4 01 WC 140 USA FEB 28 '02

2-28-02 OR 04 SPC NO: 51152 / 51153
DISK/Frame Nos 1 Thru 15/
USA VM 011 DISC/Frame ~~5-30-01~~ 1 Thru 46
XEIC 2-28-02

2/28/02 ET 05

OR 04 2-28-02 ENTERED IN ERROR

30-2 **Record** all facility discrepancies in S0007. **Submit** copy to PAD leader and **notify** TBC/CTC. **Verify** no constraints to continue. Forward description(s) of debris found to SPOC QC for entry into Processing Debris / FOD Database.

WC 140 USA Dev. GC P No. 02 FEB 28 '02

WC 140 USA FEB 28 '02

PH-H Armond Oliu Date 2/27/02
ARMOND OLIU

ET 05 6-28-02 ET 05

ETM J. Blue Date 2-27-02

30-3 Operation - Pre-launch Walkdown complete.

OR 04 FOR ET 05 2/27/02

WC 140 USA Dev. 30 ADD T No. 01 FEB 27 '02 See DEV

SPC 780

* for clarity 06/28/02

6/28-02* ET 05

Table 30-1 Photo Requirements for SSV and Launch Pad Configuration			
Photos from MLP			
Photo	**Camera Orientation**	**Lens**	**Notes**
ET -Z	Vertical	28 mm	
Aft Dome	Horizontal	28 mm	
Aft Dome	Horizontal	35-70 mm	
LH SRB from North	Horizontal	35-70 mm	All water troughs in view
LH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
LH SRB from East	Vertical	35-70 mm	
RH SRB from North	Horizontal	35-70 mm	All water troughs in view
RH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
RH SRB from West	Vertical	35-70 mm	
SRB Heater Elec T-0	Horizontal	35-70 mm	Foam intrusion; May need flash
North HDP	Vertical	35-70 mm	Representative view
South HDP	Vertical	35-70 mm	Representative view
TSM T-0 LH_2	Vertical	35-70 mm	Flash needed
TSM T-0 LO_2	Vertical	35-70 mm	Flash needed
Orbiter Left & Right Wing	Vertical	35-70 mm	From below ET (1 Photo each wing)

2-24-05 ET 05

135 Ft Level Photos

Photo	Camera Orientation	Lens	Notes
LO_2 UMB	Vertical	35-70 mm	From OWP usually during T5401
LH_2 UMB	Vertical	35-70 mm	From OWP usually during T5401

215 Ft Level Photos

Photo	Camera Orientation	Lens	Notes
ET surfaces from FSS	Vertical	35-70 mm	
LH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
RH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
Jack Pad C/O's	Horizontal	35-70 mm	Flash needed (1 each C/O)
LO_2 Ogive Cable Tray	Vertical	35-70 mm	From RSS roof

255 Ft Level Photos

Photo	Camera Orientation	Lens	Notes
ET surfaces with GO_2 vent ducts in view	Vertical	35-70 mm	
GO_2 vent ducts	Horizontal	250 mm	

***** End of Table 30-2 Photo Requirements for SSV and Launch Pad Configuration**

*** End of Operation **30** ***

2-28-02 ET 05

OPERATION 40 Ice Frost Debris Console Initial Configuration Setup

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **3.0**

> **NOTE**
> The next step sets up the photo processing laptop for use in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Network or equipment failures on the photo processing machine shall be annotated below.

40-1 **Configure** computer to perform image processing, analysis, and recording:

1. **Connect** following equipment at Ice/Frost console:
   - power cable to computer
   - "Dazzle" capture card to laptop parallel port
   - "Y" adapter to laptop PS2 port
   - keyboard to keyboard port on "Y" adapter
   - mouse to mouse port on "Y" adapter
   - monitor to laptop
2. **Insert** Xircon Network Card into Personal Computer PCMCIA port.
3. **Connect** ethernet (gray) cord to Xircon Network Card.
4. **Remove** terminator from video cable.
5. **Plug** BNC-to-RCA adapter into end of video cable.
6. **Plug** video cable into "Dazzle" DVC "video in".
7. **Power-up** Trouble Console VCR.

2-29-02
ET 05

8. **Log-on** to KSC Ground Ops. **Click-on** Start/Programs/Dazzle.

9. **Confirm** above equipment as operational and record results.

Results ALL SYSTEMS FUNCTIONAL

ETM Richards 2-27-02

NOTE

The next step verifies the setup of the infrared scanners. This is not a constraint to set up of the ice console. IR scanner condition shall be annotated below.

40-2 **Verify** IR scanner operation condition, annotate below.

RSS: OPERATIONAL

CS 2: OPERATIONAL

NOTE

The next step verifies the operation of console monitors in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Equipment condition shall be annotated below.

40-3 **Verify** console condition by powering on monitors and tape recorders.

Monitors: ✓ OK

Tape recorders: ✓ OK

2-27-02

OR 01 2-28-02

2-28-02

NOTE

ET OTV pre-mapping/initial position of cameras may be performed in random order.

Ref: 79K24576 (LI) OTV System Installation, LC 39, Pad A and
Ref: 79K24522 (LI) OTV System Installation, LC 39, Pad B define OTV camera locations.

FOV designates field-of view. RSS and -Y OWP must be retracted for completion of pre-mapping.

Pre-mapping steps/substeps in the remainder of this operation need not be performed if supporting a scrub turnaround and if performed during a previous run.

It is preferred to record all pre-mapping scanning on a single tape. However, multiple tapes may be used when lighting/ launch countdown constraints necessitate such.

40-4 CVM1 JTV1 223

Perform OTV pre-mapping of External Tank exterior surfaces using OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, and 067/167 as follows:

- **Insert** designated pre-map tape into trouble console VCR.
- **Punch-up** camera number on trouble monitor.
- **Start** recording on pre-map tape. **Record** start time (GMT).
- **Scan** from top-to-bottom, left-to-right and right-to-left at approximately full zoom-in.
- **Stop** recording on pre-map tape. **Record** stop time (GMT).
- **Record** data in Table 40-1.
- **Repeat** with each OTV camera listed until each has been used to scan the External Tank.
- **Remove** pre-map tape from trouble console VCR.

ETM R Brewer Date 2/28/02

Not Performed: N/A

9-29-02
ET 05

01-09-2002
APPROVED

OMI S6444 J03
APPROVED

40-5 CVM1 JTV1 223

Position OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 070/170, and 071/171 to initial positions as defined in Table 40-2.

ETM ET 05 Date 2/28/02

Not Performed: N/A

2-28-02 ET 05

Table 40-1 ET Pre-Mapping Data Tape # _____

OTV Camera	Start Time (GMT)	Stop Time (GMT)
004 / 104	20:51	20:54
009 / 109	20:55	21:00
013 / 113	21:10	21:14
033 / 133	21:15	21:21
042 / 142	21:22	21:33
054 / 154	21:34	21:50
055 / 155	21:51	22:10
056 / 156	22:10	22:28
060 / 160	22:28	22:30
061 / 161	22:30	22:53
062 / 162	22:53	23:12
063 / 163	23:14	~~23:20~~ (23:20)
064 / 164	23:21	23:28
065 / 165	23:29	23:31
066 / 166	23:31	22:33
067 / 167	23:33	23:40

* ET 05 6-28-02

Notes: CAMERA 064, SOME SHADE/DARK AREAS-

6-28-02 * ET 05

Table 40-2 OTV Camera Initial Positions	
OTV Camera	**Initial Position**
004 / 104	FOV centered on GUCP
009 / 109	FOV on LH_2 Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 063/163 and 064/164.
013 / 113	Full zoom in. View SW GO_2 Vent Louver area.
033 / 133	FOV perpendicular to ET and with LO_2-to-Intertank splice at frame top and LH_2-to-Intertank splice at frame bottom. Then tilt down until XT2058 is in frame center.
042 / 142	FOV centered on Orbiter Access Arm-to-Orbiter interface.
054 / 154	FOV to encompass approximately 3 feet forward of XT2058 to 2 feet aft of XT2058. Orbiter wing and SRB should be in view at frame left.
055 / 155	Set FOV on north bridge LH_2 pipeline flange.
056 / 156	FOV with LH_2 Aft Dome in frame bottom and XT2058 in view at frame top.
060 / 160	Full zoom in. View SW GO_2 Vent Louver area.
061 / 161	Full zoom-in. Adjust FOV until ET LO_2-to-Intertank splice is centered vertically and view is perpendicular to ET. Pan right until edge of the ET comes into view. Note: LO_2 Tank may pass out-of-view.
062 / 162	Full zoom in. View NW GO_2 Vent Louver area.
063 / 163	FOV on LH_2 Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 064/164.
064 / 164	FOV on LH_2 Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 063/163.
065 / 165	Full zoom out. Set FOV on aft part of ET with frame bottom approximately 2 feet below LH_2 Aft Dome.
066 / 166	FOV perpendicular to ET with LO_2-to-Intertank splice at frame top. Then tilt down until Orbiter RH Wing/SRB intersection is in frame lower right.
067 / 167	Set FOV with LH_2 Aft Dome toward frame bottom and 2nd black ring of SRB in view.
070 / 170 071 / 171	Select down wind camera of these two as wide angle view of the SSV. Set up wind camera for close-up view of SSME's.

ET
05

2-28-02

40-6 Operation - Ice Frost Debris Console Initial Configuration Setup complete.

ETM ET 05 Date 2-28-02

*** End of Operation 40 ***

ET 05

OPERATION 50 SSV Debris Assessment

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **18.0**

NOTE

Steps in this operation are contingent upon progression of launch countdown operations and may not be performed if countdown is terminated.

Entire Operation Not Performed: N/A

NOTE

Until otherwise indicated, all times are referenced to S0007, S0014 or S0037 timelines.

No operations/steps within this subtask OMI may be performed as a stand-alone procedure. This OMI may only be performed as a subtask to S0007/S0014/S0037.

NOTE

Ref: SPI SP-519 (LI) OMI and OM Implementation and Ref: SFOC GO0007 (LI) Quality Planning Requirements Document (QPRD), following step complies with requirements for ROR-as-CMQC function.

50-1

CTIF TBC
TBC CMQC 136

Notify TBC that CTIF will perform the CMQC function for STS 109, S6444 run 1. Request TBC notify CMQC that the ROR-as-CMQC option will be exercised for STS 109, S6444 run 2.

For ETO OR 04 2-28-02

50-2

CTC TBC 232
TBC CTIF 136

Perform OTV and ice/frost monitoring area setups.

ETM ET 05 Date 2/28/02

50-3

CTIF TBC 136
TBC CTC
CTC STM 232

Verify Operation 10 - Support Preparations complete.

ETM ET 05 Date 2/28/02

50-4

CTIF

Verify Operation 20 - Ice Prediction Briefing and Operation 30- Pre-launch Walkdown complete.

ETM ET 05 Date 2/28/02

2-28-02 ET 05

50-5

CTIF	**CVM1**	**222**
	CVM1	**222**

Verify:

- All OTV cameras are on, tapes in recorder, and ready to commence OTV scanning, monitoring, and recording.
- Trouble tape recorder is ready.
- Ice Frost Debris Console Initial Configuration Setup complete.

ETM ET 05 Date 2/28/02

50-6

CTIF	**CICE**	**222**
	CVM1	
	CVM2	
	CIPC	
CTIF	**JYVR**	**138**
CVM1	**JTV1**	**223**
CVM2	**JTV2**	**225**

All personnel participating in OTV operations **report** test ready status.

ETM R Brewer Date 2/28/02

Support: COMM

ET 05

2-28-02

50-7

CTIF TBC 136
TBC CTC 232

Ice Frost Console Area Setups for OTV scanning complete.
Report readiness.

ETM R Brewer Date 2/28/02

Not Performed: N/A

50-8

CTIF CVM1 222

From start of LO_2 chilldown until seal deflation/GO_2 vent hood retraction, **monitor** the +Y/-Y GO_2 vent seal-to-ET interface for seal fretting and continuous GO_2 escape.

OMRS S00FB0.350-1

ETM R Brewer Date 2/28/02

Not Performed: N/A

NOTE

GO_2 vent seal fretting could induce damage to ET SOFI. Continuous GO_2 venting could result in formation of ice in the no ice zone (ref NSTS 16007). Ultimate decision to lift the vent hood rests with CMEC.

50-9

CTIF TBC 136
CMEC

If +Y/-Y GO_2 vent seal fretting or continuous GO_2 escape detected from start of LO_2 chilldown until seal deflation, **notify** CMEC for GO_2 vent hood removal.

ETM N/A Date N/A

Not Performed: ME 08 3-1-02

50-10

CTIF CIPC 222

Monitor wind speed and direction from start of LO_2/LH_2 chill down through launch/scrub. CIPC **notify** CTIF if winds measured at 38 knots or greater from North +/-30 degrees as measured at 60 feet.

ETM ME 08 Date 3-1-02

Not Performed: N/A

ET 05 4-1-02

NOTE

Excessive vapors are defined as being more severe than those described in NSTS 08303 (LI) NSTS Program Ice/Debris Inspection Citeria or NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem.

50-11

CTIF CVM1 222
CVM2

From start of LO_2/LH_2 loading until Prepressurization (LO_2 at T-2M55s and LH_2 at T-1M57s):

1. **Monitor** following ET-Orbiter MPS areas for leakage:
   - LO_2 Feedline (portion external to the Intertank)
   - LH_2 Feedline
   - LH_2 Recirculation Line
   - LH_2 Aft Dome Manhole Cover(s)
   - ET-Orbiter LO_2/LH_2 Umbilical Disconnects
   - LH_2 T-0 Umbilical
   - LO_2 T-0 Umbilical

2. **Verify** no visible cryogenic liquid of excessive vapors.

OMRS S00FB0.360-1

ETM ME 08 Date 3-1-02

Not Performed: N/A

4-1-02

50-12

CTIF CVM1 222
CVM2

Monitor and **videotape** following ET TPS surface areas and GO_2 Vent Area during LO_2/LH_2 loading through Prepressurization (LO_2 at T-2M55s and LH_2 at T-1M57s):

- LH_2 Aft Dome
- LH_2 Barrel
- Intertank (external)
- LO_2 Tank
- GO_2 Vent Area
- Protuberances

OMRS S00FB0.005-1

ETM ME 08 Date 3-1-02

Not Performed: N/A

50-13

CTIF CVM1 222

Perform Operation 60 - Group 1 Monitoring.

ETM ME 08 Date 3-1-02

Not Performed: N/A

4-1-02
TEL

50-14

CTIF CVM2 222

Perform Operation 70 - Group 2 Monitoring.

ETM ME 08 Date 3-1-02

Not Performed: N/A

50-15

CTIF CVM2 222

Once per hour minimum, after start of LO_2/LH_2 (until LO_2/LH_2 low level sensors read dry), **scan** LO_2 feed line brackets and flange closeouts per Table 50-1.

ETM ME 08 Date 3-1-02

Not Performed: N/A

ST 08 4-1-02

50-16

CTIF CICE 222

As count proceeds, for concerns/ observations identified:

1. **Record** observation/concern on trouble tape per Table 50-1.

2. **Document** observed condition on Table 50-2, Observation Worksheet.

ETM ME 08 Date 3-1-02

Not Performed: N/A

50-17

TBC CTIF 136
CTIF CICE 222

Perform Operation 80 - Final Inspection when called by S0007/S0014/S0037.

ETM ME 08 Date 3-1-02

Not Performed: N/A

ET 05
4-1-02

NOTE

Final SSV scan typically commences at L-2 hours.

50-18

CTIF CVM1 222
CVM2

Perform final SSV scan.

ETM ME 08 Date 3-1-02

Not Performed: N/A

50-19

CTIF CVM1 222
CVM2

At start of T-9 minute hold, **configure** OTV cameras for terminal count.

ETM ME 08 Date 3-1-02

Not Performed: N/A

WC 150 USA FEB 8 '02 Day 50 No. 01 P

OR 04 FOR ETOS 3-1-02

SEE DEV

4-1-02

NOTE

Ref: NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem Appendix F - Ice Launch Commit Criteria defines "No-Go Conditions."

50-20

CICE CTIF 222

Verify there are no Ice Launch Commit Criteria "No-Go Conditions" being violated.

ME 08

ETM_____ Date 3-1-02

50-21

If winds are from the north (+/-30 degrees) and are 38 knots (peak as measured at 60 feet above ground) or greater:

1. **Monitor/videotape** nose cone area during high winds.

2. **Verify:**

A. No ice formation on the +Y and -Y GO_2 vent seal footprint areas.

B. No damage to the ET TPS at the +Y and -Y GO_2 vent seal footprint areas.

C. No damage to the +Y and -Y GO_2 vent seals themselves.

D. No evidence of GO_2 leakage from +Y/-Y GO_2 vent seals to ET interface.

USA VM 026

OMRSD S00L00.150

ETM N/A Date N/A

Not Performed: ME 08

3/1/02

ET 05

50-22

CTIF

Verify launch or launch scrub (drain back). **Record** data.

Launch ✓ Scrub N/A

Date 3-1-02 Time 11:22 GMT

Scrub at T- N/A

ETM ME 08 Date 3-1-02

50-23

CTIF

ET-Orbiter MPS monitoring for leakage and ET TPS Surface Areas and GO_2 Vent Area monitoring/recording for launch complete.

OMRSD S00FB0.005-1 USA VM 011
OMRSD S00FB0.360-1

ETM ME 08 Date 3-1-02

Not Performed: N/A

EC 13 4-1-02

NOTE

When completely filled and drain is initiated, it takes approximately 1 hour until the LH_2 tank low level sensors read dry, and approximately 1.5 hours until the LO_2 tank low level sensors read dry.

50-24

CTIF CVM1 222
CVM2

If launch scrubbed (or drain back declared) after start of LO_2/LH_2 slow fill mode:

- **Perform** Operation 90 - LO_2/LH_2 Drain Monitoring.
- **Record** observations/concerns on trouble tape per Table 50-1.
- **Document** all observations/concerns on Table 50-2 Observation Worksheet.

ETM N/A Date N/A

Not Performed: ME 08 3-1-02

50-25 CTIF

GO_2 Vent seal to ET interface monitoring for seal fretting and continuous GO_2 escape complete.

OMRSD S00FB0.350-1 USA VM 011

ETM ME 08 Date 3-1-02

Not Performed: N/A

ET 05
4-1-02

50-26

CTIF CVM1 222
CVM2

Terminate scanning operations.

ETM ME 08 Date 3-1-02

50-27

CTIF CVM1 222
CVM2

Perform Operation 100 - Console Securing.

ETM ME 08 Date 3-1-02

50-28

CTIF

If LO_2/LH_2 tanking started, **perform** Operation 110 - Summary Tape.

ETM ME 08 Date 3-1-02

Not Performed: N/A

4-1-02
[illegible]

NOTE
Following step may be not performed at CTIF discretion.

50-29 **CTIF** **TBC** **136**
TBC **STM**

If Post Drain Walkdown to occur at night, **request** PAD xenon lighting be maintained/activated for duration of walkdown.

Not Performed: ME 08 3-1-02

NOTE
Post drain walkdown typically commences approximately 1.5 hours after LH_2/LO_2 low level sensors read dry.

50-30

CTIF

If launch scrubbed after start of LO_2/LH_2 tanking, **perform** Operation 120 - Post-Drain Walkdown.

ETM N/A Date N/A

Not Performed: ME 08 3-1-02

50-31

CTIF

If launch occurred, **perform** Operation 130 - Post launch Walkdown.

ETM ME 08 Date 3-1-02

Not Performed: N/A

4-1-02 EL

50-32

CTIF

If launch occurred, **perform** Operation 140 - Film Review.

ETM ME CB Date 3-1-02

Not Performed: N/A

50-33

SSV Debris Assessment complete.

6-1-02

Table 50-1 Observation Documentation Procedure

1.	CTIF	CVM1 CVM2	222	Locate anomaly/concern on pertinent OTV(s)
2.	CTIF			Punch-up pertinent OTV on trouble monitor. Update trouble tape log in table below.
3.	CTIF			Start the trouble tape.

NOTE

Trouble tape shall be allowed to run until sufficient OTV documentation of observation/concern has been made. OK to change OTV's while trouble tape is running.

4	CTIF	After observation/concern has been documented on the trouble tape, stop the trouble tape. Update trouble tape log below.

TROUBLE TAPE LOG

Trouble Tape No.	Start Time (GMT)	Stop Time (GMT)	OTV	Description
1	03:30	03:36	054	LOZ F/L SCAN
1	04:30	04:35	054	LOZ F/L SCAN
1	05:29	05:30	054	LOZ F/L SCAN
1	06:31	06:32	054	LOZ F/L SCAN
1	07:26	07:28	054	LOZ F/L SCAN
1	08:26	08:27	054	LOZ F/L SCAN
1	09:35	09:37	054	F/L SCAN & +Y VERT STRUT LIKE AFT DOME FROST SPOT
1	10:27	10:29	054	LOZ F/L SCAN

TROUBLE TAPE LOG

4-1-C

Table 50-1 Observation Documentation Procedure

Trouble Tape No.	Start Time (GMT)	Stop Time (GMT)	OTV	Description

*** End of Table 50-1 Observation Documentation Procedure ***

4-1-02

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. 001

Observed By: ARMANDO OLIU 03-01-02

Date 3-1-02 Time ~~3-1-02~~ 0435 ET/05 GMT 09:35

Camera No. (or Walkdown) 054

Description:

SMALL SPOT OF ICE/FROST WHERE +Y VERTICAL STRUT MEETS LH2 AFT DOME. APPROX 1/2 INCH DIA. NO VAPORS OBSERVED.

Acceptance Rationale (or IPR/PR No.):

CONDITION IS ACCEPTABLE AND IS SIMILAR TO THE CONDITION DEPICTED IN NSTS 08303 PHOTO 2.2.7.

ET/05 6-28-02 Robert F. Speece

CICE [signature] PH-H2 Date 3-01-02

CTIF [signature] Date 3/01/02

ET/05 KEN Leggett 6-28-02

6-28-02 ET/05

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

Acceptance Rationale (or IPR/PR No.):

CICE _____ Date _____

CTIF _____ Date _____

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

_____

_____

_____

_____

Acceptance Rationale (or IPR/PR No.):

_____

_____

_____

_____

CICE _____ Date _____

CTIF _____ Date _____

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

_____

_____

_____

_____

Acceptance Rationale (or IPR/PR No.):

_____

_____

_____

_____

CICE _____ Date _____

CTIF _____ Date _____

4-1-02

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

_____

_____

_____

_____

Acceptance Rationale (or IPR/PR No.):

_____

_____

_____

_____

CICE _____ Date _____

CTIF _____ Date _____

ET 05
4-1-02

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

_____

_____

_____

_____

Acceptance Rationale (or IPR/PR No.):

_____

_____

_____

_____

CICE _____ Date _____

CTIF _____ Date _____

4-1-02

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

_____

_____

_____

_____

Acceptance Rationale (or IPR/PR No.):

_____

_____

_____

_____

CICE _____ Date _____

CTIF _____ Date _____

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. _____

Observed By: _____

Date _____ Time _____ GMT _____

Camera No. (or Walkdown) _____

Description:

_____

_____

_____

_____

Acceptance Rationale (or IPR/PR No.):

_____

_____

_____

CICE _____ Date _____

CTIF _____ Date _____

***** End of Table 50-2 Observation Worksheet *****

*** End of Operation **50** ***

OPERATION 60 Group 1 Monitoring LO2 Chill Down Thru T-0

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **15.0**

NOTE

Do not perform this operation if launch scrub declared before LO_2 Chill Down commences.

Operation Not Performed: N/A

NOTE

This operation monitors LO_2 Ogive and Barrel and associated components/ areas from start of Chill Down through T-0 via OTV cameras 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164.

OTV cameras 013/113 and/or 062/162 will view -Y GO_2 Vent Hood Seal at all times. At no time will both cameras be positioned away from the -Y GO_2 Vent Hood Seal.

OTV cameras 068/168 and 069/169 view SW and NE GO_2 Vent Areas respectively. These are fixed FOV cameras and do not have pan, tilt, etc. capability.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

LO_2 Chill Down To L-2 Hour Mark

60-1 CVM1 JYVR 138

At start of vehicle LO_2 Chill Down, **start** recorders for cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169.

ETM R Brewer Date 2/28/02

Support: COMM

60-2 **Record** LO_2 MPS Chill Down start date and time (GMT).

ET05 OR 04 02/28/02 02:18 OR 04 ET05

LO_2 MPS Chill Down Date 02/28/02 GMT Time 02:18 GMT

ET 05

ETM _____ Date 02-28-02

60-3 CVM1 JTV1 223

From start of LO_2 Chill Down until start of LO_2 Fast Fill on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169 **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ET 05

ETM _____ Date 2/28/02

Support: COMM

Not Performed: N/A

4-1-02

60-4 **Record** LO_2 Slow Fill start date and time (GMT).

LO_2 Slow Fill Date 2/28/02 GMT Time ~~02:54~~ 0254 * GMT

ETM ET 05 Date 2/28/02

Not Performed: N/A

60-5 **Record** LO_2 Fast Fill start date and time (GMT).

LO_2 Fast Fill Date 2/28/02 GMT Time ~~02:56~~ 03:06 * GMT 2-28-02 ET 05 *

ETM ET 05 Date 2/28/02

Not Performed: N/A

60-6 **CVM1 JTV1 223**

From start of LO_2 Fast Fill until LO_2 stable replenish mode is established, **monitor/videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. **Scan** LO_2 Tank. **Alternate** cameras and **scan** from Intertank to LO_2 Barrel Splice to GO_2 Vent Hood. No cryogenic liquid or excessive vapors allowed.

ETM [signature] (Thor) Date 3/1/02

Support: COMM MS 17

Not Performed: N/A

ET 05

4/1/02

60-7 **Record** LO_2 Topping date and time (GMT).

① 03/01/02

LO_2 Topping Date ~~2/28/02~~ GMT Time 05:08:00 GMT

ETM ① (Thon) Date 03/01/02

MS 17

Not Performed: N/A

60-8 **Record** LO_2 Stable Replenish mode start date and time (GMT).

LO_2 Stable Replenish Date 3/01/02 GMT Time 05:13:00 GMT

ETM (Thon) Date 3/02/02

MS 17

Not Performed: N/A

60-9 **CVM1 JTV1 223**

From time LO_2 Stable Replenish mode is established until time for final SSV scan (approximately L-2 hours), **monitor, scan and videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. No cryogenic liquid or excessive vapors allowed.

ETM (Thon) Date 3/1/02

Support: COMM

MS 17

Not Performed: N/A

4-1-02

Final SSV Inspection Scan

NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

During Final SSV Inspection Scan the camera lights on OTV cameras 061/161 and 062/162 shall be turned "Off" when view passes over the Orbiter cockpit to preclude "distracting" the Flight Crew.

60-10 CVM1 JTV1 223

Perform Final SSV Inspection Scan with OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164. Scan passes shall view entire SSV with cameras at approximate full zoom in during final scan.

ETM (Thon) Date 3/1/02

MS 17

Not Performed: N/A

4-1-02

Terminal Count Camera Positions

NOTE

This step performed for SSME ignition only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute count. Cameras must be positioned for ignition no later than T-9 minutes. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM1 camera positions for SSME ignition are defined in Table 60-1.

60-11 **CVM1** **JTV1** **223**

Ref Table 60-1, **position** cameras 004/104, 013/113, 042/142, 054/154, 060/160, 062/162 for terminal count.

ETM _____ Date 3/1/02

Support: COMM

Not Performed: N/A

60-12 Operation - Group 1 Monitoring - LO_2 Chill Down Thru T-0 complete.

Table 60-1 CVM1 Camera Positions for Terminal Count

NOTE

This Table defines CVM1 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition non-sequentially.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

The GO_2 Vent Arm (GVA) retracts at T-2m30s.

CVM1 Camera Positions Are Defined As Follows:

004/104

GUCP centered in frame so that GUCP will stay in view throughout SRB "twang".

042/142

At approximately T-1 hour, view and monitor Orbiter access arm while Orbiter hatch is being closed.

At **T-7m30s**, watch Orbiter access arm retract, then view bipod strut in center of frame, LO_2 feedline fairing in top of frame, and Orbiter hatch in right of frame.

054/154

At **T-3m50s**, view Orbiter right hand body flap movement, then zoom out with Orbiter/ET umbilicals at approximate frame center, Orbiter trailing edge at frame bottom, and edge of +Y (RH) SRB just in view at frame right.

4-1-07

Table 60-1 CVM1 Camera Positions for Terminal Count

013/113
At **T-2m30s**, watch lift of GO_2 vent arm for debris and nose cone/vent louvers for ice damage. Immediately following lift of GO_2 vent arm, center frame on GO_2 vent louver and then zoom-out so that entire ET movement is seen during SRB 'twang' at SSME ignition.

060/160
At approximately **T-2m30s**, after GO_2 vent arm retracts, go full zoom in for a close-up inspection of the GO_2 vent louver. After CICE concurrence, go full zoom out and position camera with SSV centered and ET nose cone at frame top.

062/162
At approximately **T-2m30s**, after GO_2 vent arm retracts, go full zoom in for a close-up inspection of the -Y GO_2 vent louver. After CICE concurrence, zoom out until ET nose spike is at top of frame with ET centered.

061/161
At approximately **T-4m00s**, verify camera lights are off. Then position camera to view astronaut closing visor at T-2 minutes 00 seconds.

068/168 and 069/169
Immediately after GO2 vent hood lift, turn lights off to preclude distracting orbiter crew when the GVA rotates to its latchback position.

***** End of Table 60-1 Camera Positions for Terminal Count *****

*** End of Operation **60** ***

01-09-2002
APPROVED

OMI S6444 J03
APPROVED

OPERATION 70 Group 2 Monitoring - LH_2 Chill Down Thru T-0

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **15.0**

NOTE

Do not perform this operation if launch scrub declared before start of LH_2 Chill Down.

Operation Not Performed: N/A

NOTE

This operation monitors LH_2 Barrel and associated components/areas start of LH_2 Chill Down to pre-pressurization via OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

LH_2 Chill Down To L-2 Hour Mark

70-1 **CVM2 JYVR 138**

At start of LH_2 Chill Down, **start** recorders for cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

ETM (Thon) Date 2/28/02

MS 17

Support: COMM

70-2 **Record** LH_2 Chill Down start date and time (GMT).

MS 17 02:15:04

LH_2 Chill Down Date ~~2/28/02~~ 03/01/02 Time ~~02:29:00~~ 02:15:04 GMT

ETM (Thon) Date 2/28/02

MS 17

70-3 **CVM2 JTV2 225**

From start of propellant loading until start of LH_2 Fast Fill on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM (Thon) Date 2/28/02

Support: COMM

MS 17

Not Performed: N/A

4-1-02

70-4 **Record** LH_2 Slow Fill start date and time (GMT).

03/01/02
LH_2 Slow Fill Date ~~2/28/02~~ Time 02:29:44 GMT

ETM _____ Date 2/28/02
(Thon)
MS 17 **Not Performed:** N/A

70-5 **Record** LH_2 Fast Fill start date and time (GMT).

03/01/02
LH_2 Fast Fill Date ~~2/28/02~~ Time 03:07:44 GMT

ETM _____ Date 2/28/02
(Thon)
MS 17 **Not Performed:** N/A

70-6 **CVM2** **JTV2** **225**

From start of LH_2 Fast Fill until stable replenish mode is established, **scan** LH_2 Tank. **Alternate** OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167 and **scan/videotape** from LH_2 Aft Dome to Intertank.

Support: COMM

ETM _____ Date 2/28/02
(Thon)
MS 17 **Not Performed:** N/A

4-1-02

70-7

Record start date and time (GMT) for LH_2 Topping.

LH_2 Topping Date 2/28/02 Time 04:18:00 GMT

ETM [signature] (CTSA) Date 2/28/02

Not Performed: N/A

MS 17

70-8 **Record** LH_2 Stable Replenish mode start date and time (GMT).

LH_2 Stable Replenish Date 3-1-02 Time 0449 GMT

ETM [signature] Date 2-28-02

W. RICHARDS

Not Performed: N/A

70-9 **CVM2 JTV2 225**

During LH_2 Stable Replenish mode and until time for final scan (approximately L-1.5 hours), on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET TPS surfaces including LO_2 Feed Line, LH_2 Feed Line, LH_2 Recirculation Line, LH_2 Aft Dome and manhole covers, LH_2/LO_2 Umbilicals, and TSM LH_2/LO_2 Umbilicals. No cryogenic liquid or excessive vapors allowed.

MS 16

ETM [signature] Date 1 Mar 02

Support: COMM

Not Performed: N/A

4-1-02

Final SSV Inspection Scan

NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final SSV Inspection Scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

70-10 CVM2 JTV2 225

Perform Final SSV Inspection Scan with OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 064/164. Scan passes shall view entire SSV with cameras at full zoom in during final scan.

MS 16

ETM _____ Date 1 Mar 02

Support: COMM

Not Performed: N/A

T-9 Minute Terminal Count

NOTE

Next step performed for terminal count only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute terminal count. Cameras must be positioned for SSME ignition no later than T-9 minutes. 'Spot' scanning after pick-up of the T-9 minute terminal count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM2 camera positions for terminal count are defined in Table 70-1.

70-11 **CVM2 JTV2 225**

Ref Table 70-1, **position** cameras 009/109, 033/133, 056/156, 065/165, 066/166 061/161, 070/170, 071/171 and 067/167 for terminal count.

MS 18

ETM _____ Date 1 Mar 02

Support: COMM

Not Performed: N/A

70-12 Operation - Group 2 Monitoring - LH_2 Chill Down Thru T-0 complete.

4-1-02

Table 70-1 - CVM2 Camera Positions for Terminal Count

NOTE
This Table defines CVM2 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence. The Orbiter access arm (OAA) retracts at T-7M30S. Orbiter body flap movement occurs at T-3m50s. Cameras may be positioned for SSME ignition non-sequentially Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

Group 2 Camera Positions Are Defined As Follows:

033/133
Full zoom out. LO_2 feed line in frame center and MLP deck at bottom.

055/155
View ET aft dome with MLP deck just out of view at bottom, ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

056/156
View ET aft dome with MLP deck just out of view at bottom. ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

065/165
Full zoom out. SSV centered. MLP deck edge just in view at bottom.

066/166
ET centered. Intertank to LO_2 Barrel splice at frame top with the majority of Orbiter wing in view.

067/167
Center on GUCP for optimum view.

070/170 and 071/171
At **T-9m00s**, zoom in on space shuttle main engine with camera providing best view. Zoom out on SSME for wide angle view with other camera.

009/109
At approximately **T-3m50s**, position to view Orbiter body flap and elevons movement. Afterwards, center on LH_2 umbilical with -Y vertical strut at frame top.

061/161
At approximately **T-1m30s**, tilt-up to GO_2 Vent Footprint. Zoom in. Pause. If footprint is acceptable, zoom out and tilt down to view Orbiter nose/cockpit through liftoff.

***** End of Table 70-1 - CVM2 Camera Positions for Terminal Count *****

*** End of Operation **70** ***

4-1-02

OPERATION 80 Final Inspection

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **PAD A/B**
Hazard (Y/N): **Y**
Duration (Hrs): **3.0**

NOTE

Final Inspection may not need to be performed depending on LO_2/LH_2 tanking and launch countdown, as determined by CTC/TTL.

Final Inspection Team stay time guidelines for each level are given in Table 80-1. These guidelines are for reference only and may be deviated from at PICE discretion.

Operation Not Performed: N/A

4-1-05
80M

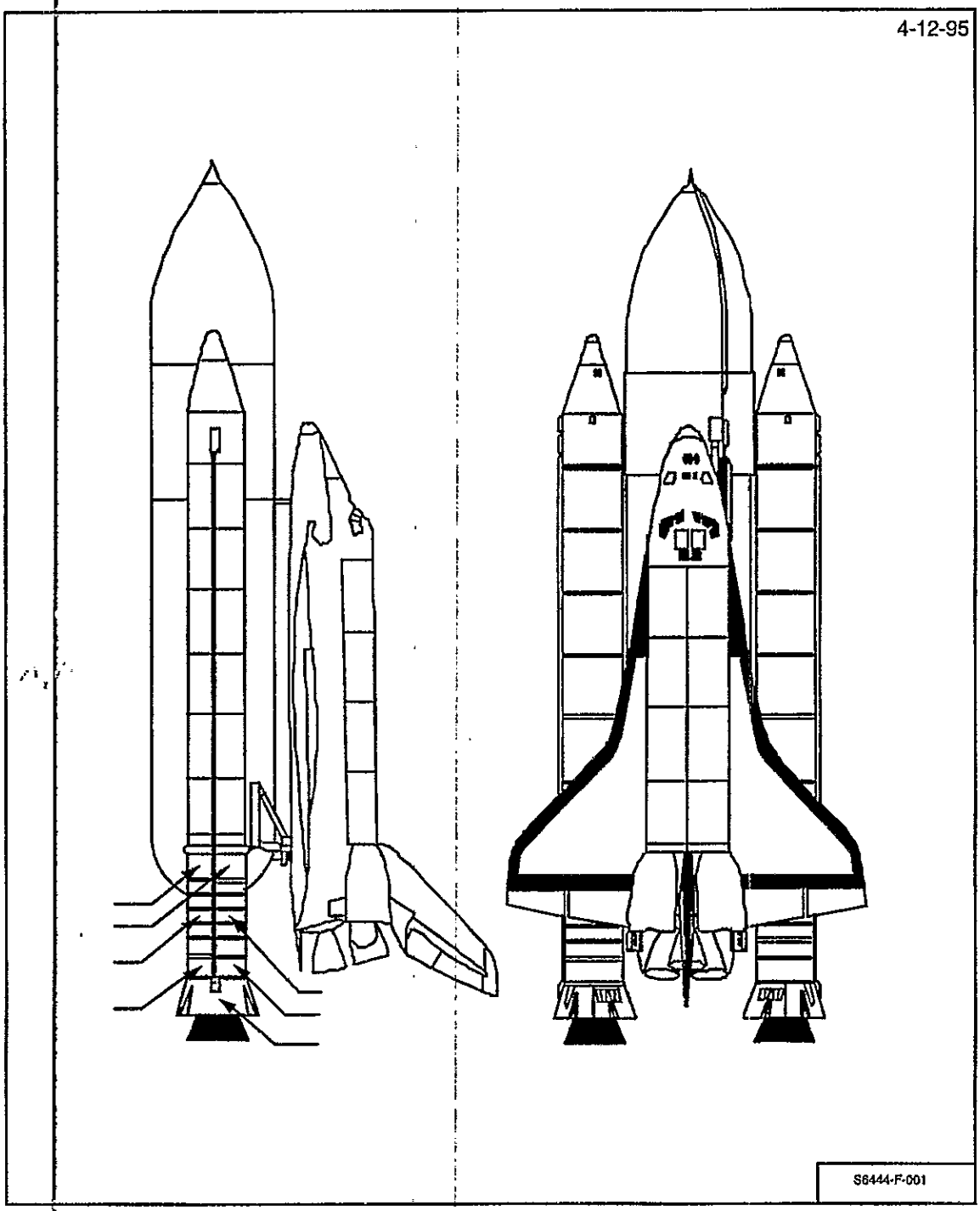


Figure 80-1: Deck (0) Level
(For Reference Only)

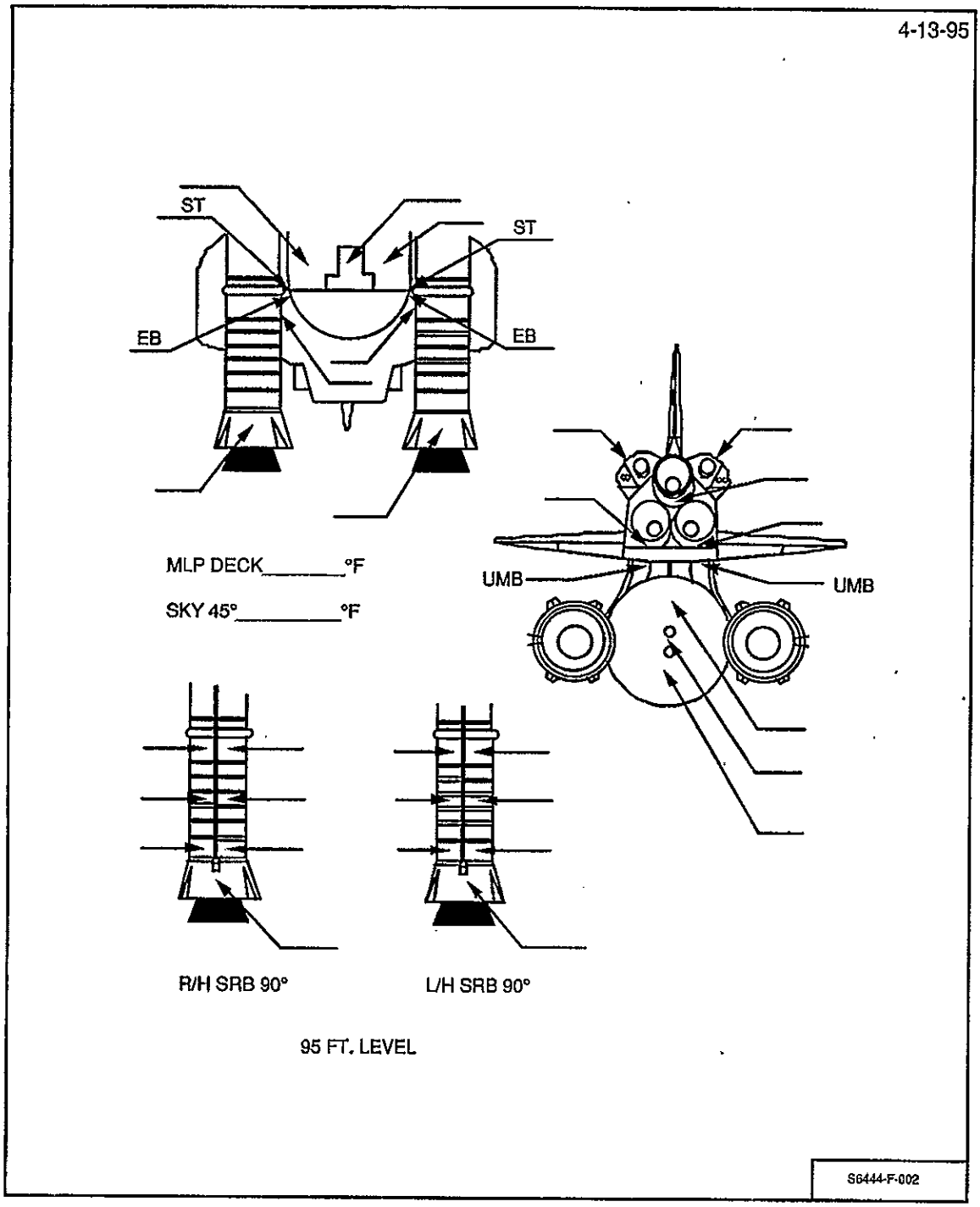


Figure 80-2: Deck (0) and 95 Ft Levels
(For Reference Only)

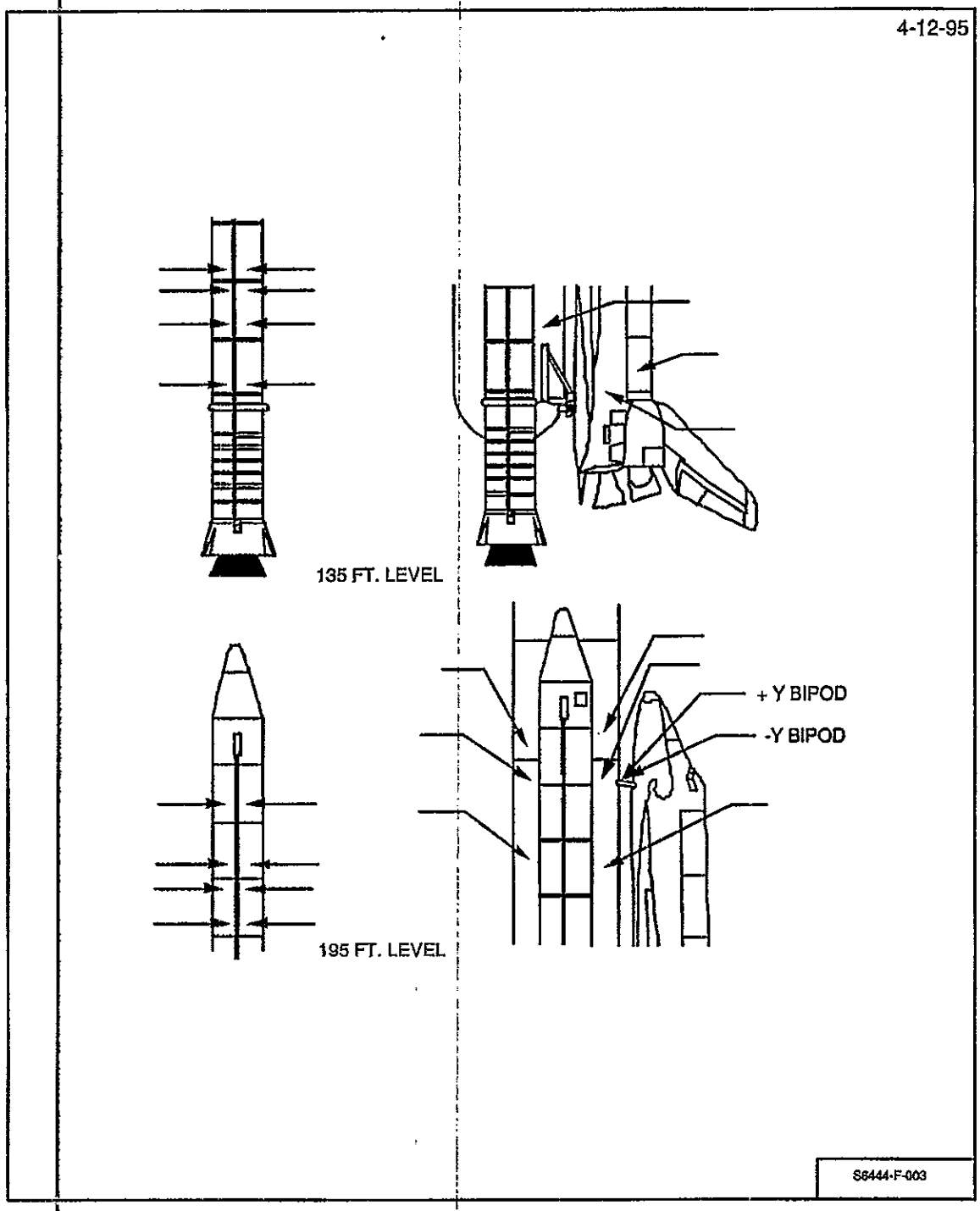


Figure 80-3: 135 and 195 Ft Levels
(For Reference Only)

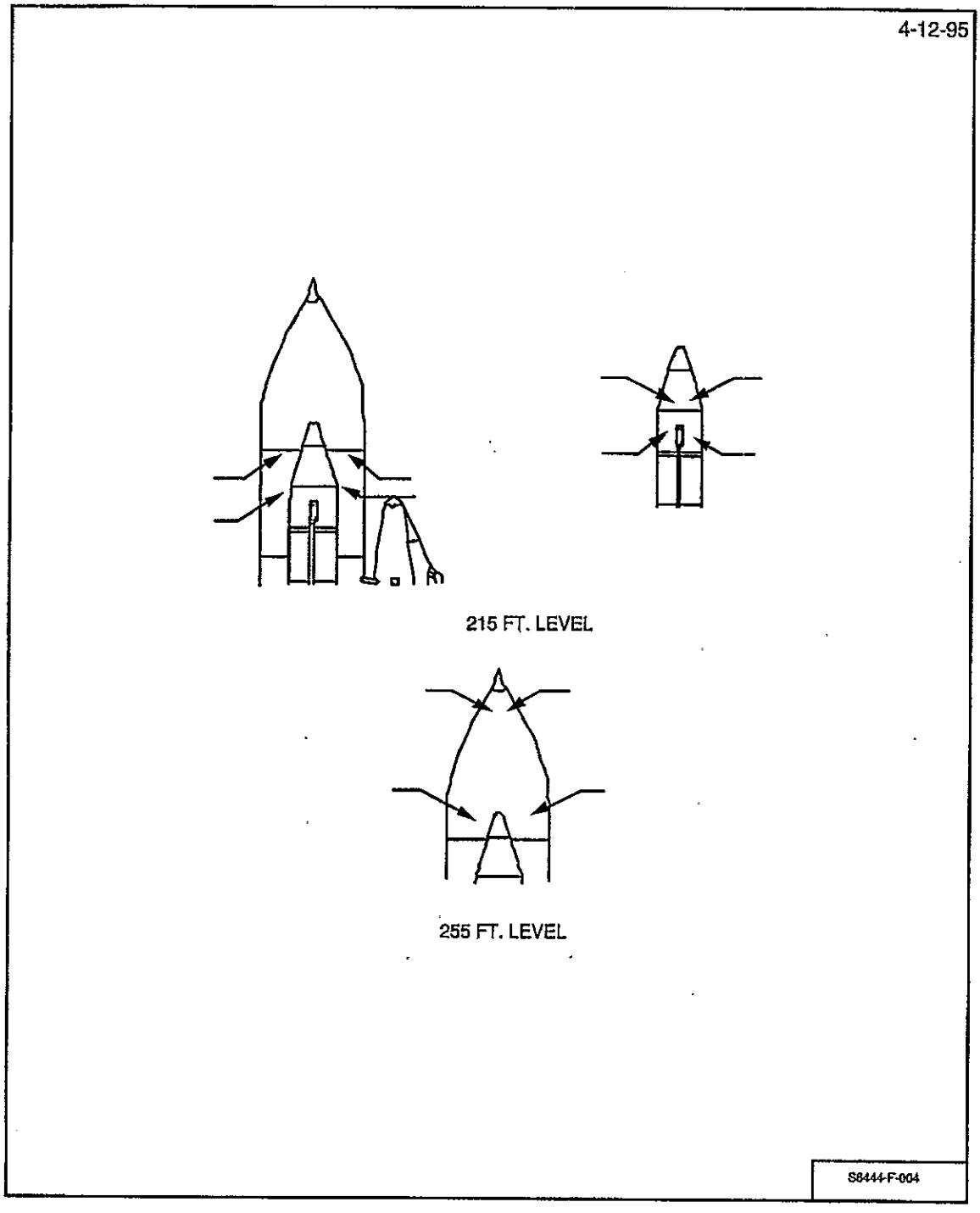


Figure 80-4: 215 and 255 Ft Levels
(For Reference Only)

WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

WARNING

Personnel performing final inspection shall be attired in **Nomex coveralls with gloves and hoods**. Personnel shall have available gloves, hoods, and **ELSA** at all times during walkdown.

Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in bayonet connector and the lithium button battery door is locked and taped in place. Personnel shall ensure the flash is not activated on the camera.

Personnel using Kodak DC-50/120 shall verify alkaline batteries are properly installed and the flash is not active on the camera.

Personnel using digital cameras (Sony DKC ID1, Kodak DC-50/120 shall not use these cameras in the presence of a hydrogen leak or an oxygen enriched atmosphere (readings greater than 23 percent O_2).

NOTE

Task Team Leader (TTL) for final inspection is PH-H. Additional personnel (listed below) may be added to the final inspection team with CTC, Launch Director, and Safety concurrence.

JSC Level II	(1)
PH-H	(2)
SFOC ETM	(1)

80-1 **Assemble** following final inspection team members:

TTL - PH-H	(1)
PH-H	(1)
SFOC ETM	(2)
LMSSC LSS	(1)
SFOC Safety	(1)

80-2 Final inspection team **perform** walkdown of SSV and associated facilities as follows:

> **NOTE**
> Following substep may be not performed with TTL concurrence.
>
> Tables 80-2 and 80-3 are reference only items. Images are to be taken of targets of opportunity. Images must be taken with 35 mm and digital cameras. Digital images shall be inputted into SIMS.

1. Ref Tables 80-2 and 80-3, photograph SSV points of opportunity during final inspection using 35 mm. **Record** data.

Roll No. N/A

Negative No. N/A

Work order No. N/A

Sub Step Not Performed: ME OB 3-1-02

2. Reference Tables 80-2 and 80-3, **take** digital image of SSV points of opportunity using digital camera.

SPC No: 51103 / 51157

Description: Final Inspection Team Disc/Frame Nos: 1-41 / 1-50

WC 140 USA Dem. GC No. 01 P WC 140 USA FEB 28 02 FEB 28 02

3. See Figures 80-1 through 80-4, **measure and record** (deg F) SSV external surface temperatures using IR gun(s)/scanners.

NOTE

The following substep references inspection areas. However, inspection shall not be limited to these areas. Inspection shall be of entire SSV and specific areas of concern as defined by the TTL, CTC, or Launch Director.

4. **Visually inspect:**

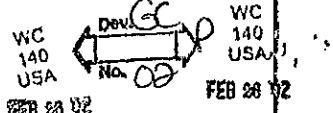
- Orbiter aft engine compartment external surfaces for condensation and ice formations.
- ET TPS surfaces which cannot be observed by the OTV system.
- Specific areas of concern as determined by the TTL, CTC, or Launch Director.

OMRSD S00U00.020-A-1

OMRSD S00U00.020-C-1

OMRSD S00U00.020-D-1

80-3 Final Inspection complete. **Verify** no constraints to continue. Forward descriptions of debris found to SFOC QC for entry into Processing Debris / FOD Database.



TTL (PH-H) R Pyke M. Payne Date 3-1-02

6-28-02

SFOC-ETM R Brewer Date 3-1-02

80-4 Operation - Final Inspection complete.

ETM ME 08 Date 3-1-02

6-28-02

Table 80-1 Final Inspection Team Walkdown Stay Times

255 Ft Level - 5 Minutes

- LO_2 Ogive and Barrel acreage
- GO_2 Pressurization Line
- LO_2 Tank Cable Tray
- Visible LH SRB surfaces
- GO_2 Vent Ducts

215 Ft Level - 20 Minutes

- ET GH_2 7 inch Vent Assembly
- ET acreage (between -Z and -Y axis)
- GO_2 vent area
- Orbiter tiles
- Visible SRB surfaces
- Inter tank-to-LO_2 Barrel splice

195 Ft Level - 10 Minutes

- LO_2 Feed Line
- ET/Orbiter Bipods (side and bottom view)
- -Y ET/SRB forward attachment (bottom view)
- -Y ET/SRB aft attachments (top view)
- Inter tank splice areas (LO_2 and LH_2)
- ET acreage (between -Y and +Z axis)
- Orbiter tiles
- Visible LH SRB surfaces

135 Ft Level - 10 Minutes

- LH_2 ET/Orbiter Umbilical
- -Y ET/SRB C/T
- -Y Vertical Strut
- LO_2 Feed Line
- ET acreage between -Y axis and +Z axis
- ET/Orbiter attachments (top view)
- Visible LH SRB surfaces
- Orbiter aft fuselage

4-1-02

Table 80-1 Final Inspection Team Walkdown Stay Times

0 Level - 30 Minutes

- LH_2 Aft Dome
- ET acreage around +Z axis
- ET acreage around -Z axis
- LO_2 Feed Line
- LH_2 Feed Line
- ET/Orbiter attachments - Bottom view
- ET/Orbiter LH_2 and LO_2 Umbilicals
- T-0 LH_2 and LO_2 Umbilicals
- Space Shuttle Main Engines (SSME)
- Orbiter tiles
- ET/SRB aft attachments
- Visible SRB surfaces
- SRB ignition overpressure sound suppression water troughs

*** End of Table 80-1- Final Inspection Team Walkdown Stay Times ***

4-1-02

Table 80-2 Final Inspection Team - Telephotos

TELEPHOTOS - 255 FT LVL

Photo	Camera Orientation	Notes
GO_2 Vent Ducts	Horizontal	
LO_2 Acreage	Vertical	

TELEPHOTOS - 215 FT LVL

Photo	Camera Orientation	Notes
-Y Bipod Ramp	Horizontal	From RSS
LO_2 P/L Ice Frost Ramps	Vertical	From RSS; Requires 3-4 shots
GO_2 Seal/Hood	Horizontal	From haunch & RSS
GUCP	Vertical	

TELEPHOTOS - 195 FT LVL

Photo	Camera Orientation	Notes
-Y Bipod Ramp & Jack PAD C/O	Horizontal	

TELEPHOTOS - 135 FT LVL

Photo	Camera Orientation	Notes
LH_2 UMB	Horizontal	
-Y Longeron	Vertical	If needed
Jack Pad Closeouts	Horizontal	
LH_2 Acreage	Vertical	

ET G5

Table 80-2 Final Inspection Team - Telephotos

TELEPHOTOS - MLP

Photo	Camera Orientation	Notes
LH_2 UMB	Horizontal	From West
LH_2 UMB	Horizontal	From NW
EB-7	Horizontal	
EB-8	Horizontal	
LH_2 Aft Dome	Horizontal	
Third Hard Point C/O	Vertical	
LH_2 Barrel	Horizontal	From North
SSV Overall	Horizontal	From North
SSV Overall	Horizontal	From East
LO_2 F/L Bracket & Bellows	Vertical	XT-1973
LO_2 F/L Bracket	Vertical	XT-1871
LO_2 F/L Bracket	Vertical	XT-1623
LO_2 F/L Bracket	Vertical	ST-1377 & XT-1129
LO_2 F/L Bracket & Bellows	Vertical	XT-1129 & XT-1106 from SE
LO_2 F/L & C/T	Vertical	From SE

600 MM PHOTOS - 255 FT LVL

Photo	Shutter Speed	Notes
GO_2 Vent Ducts	1/30	Contingency

4-1-02

600 MM PHOTOS - 215 FT LVL

Table 80-2 Final Inspection Team - Telephotos

Photo	Shutter Speed	Notes
-Y GO_2 Seal	1/30	
-Y Bipod Ramp	1/30	Contingency
Jack Pad C/O's	1/4	Difficult if windy
LO_2 F/L	1/15	
-Y Vertical Strut (Crack)	1/30	

600 MM PHOTOS - 195 FT LVL

Photo	Shutter Speed	Notes
-Y Bipod Ramp	1/30	Contingency

600 MM PHOTOS - 135 FT LVL

Photo	Shutter Speed	Notes
LH_2 UMB	1/30	
-Y Vertical Strut (Crack)	1/60	
LO_2 F/L Bellows	1/15	Contingency

600 MM PHOTOS - MLP

4-1-02
ET 05

Table 80-2 Final Inspection Team - Telephotos

Photo	Shutter Speed	Notes
LH_2 UMB	1/30	From West
LH_2 UMB	1/30	From NW
LH_2 UMB	1/30	From East
LH_2 UMB Actuator C/O	1/15 or 1/30	From North standing next to water pipe
LO_2 UMB	1/5	Lower Inboard
LO_2 UMB	1/8	Inboard
LO_2 F/L Bracket & Bellows	1/15	One photo to include XT-1978 & XT-1973
LO_2 F/L Bracket	1/15	XT-1871
LO_2 F/L Bracket	1/15	XT-1623
LO_2 F/L Bracket	1/15	XT-1377
LO_2 F/L Bracket	1/30	One photo to include XT-1129 & XT-1106
LO_2 F/L Bracket	1/30	From SE corner; One photo to include XT-1129 & XT-1106
Jack Pad C/O's	1/15	From SE corner
Ice Frost Ramps or Pal Ramps	1/15 or 1/30	Contingency
LH_2 UMB Inboard	1/15	From East
+Y Longeron	1/15 or 1/30	Contingency
-Y Longeron	1/15	Contingency

WIDE ANGLE PHOTOS - 255 FT LVL

11-1-02

Table 80-2 Final Inspection Team - Telephotos

Photo	Camera Orientation	Lens	Notes
LO_2 Tank	Vertical	35-70 mm	
GO_2 Vent Ducts	Horizontal	35-70 mm	

WIDE ANGLE PHOTOS - 215 FT LVL

Photo	Camera Orientation	Lens	Notes
Overall GH_2 Vent Line	Horizontal	35-70 mm	
Orbiter Nose, ET -Y Side	Horizontal	35-70 mm	
Orbiter Nose, ET -Y, +Z Side	Horizontal	35-70 mm	From RSS
Forward Half of Vehicle	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE PHOTOS - 195 FT LVL

Photo	Camera Orientation	Lens	Notes
Aft Part of SSV, LH Wing	Vertical	35-70 mm	
Orbiter Fwd Section, Upper LH_2 Tank	Vertical	35-70 mm	
Bipod, -Y, +Z Intertank Area	Horizontal	35-70 mm	

WIDE ANGLE PHOTOS - 135 FT LVL

Photo	Camera	Lens	Notes

Table 80-2 Final Inspection Team - Telephotos

	Orientation		
Orbiter Aft Section	Vertical	35-70 mm	
Lower LH_2 Tank & LH SRB	Vertical	35-70 mm	

WIDE ANGLE PHOTOS - MLP

Photo	Camera Orientation	Lens	Notes
Overall Orbiter Left Side	Vertical	28 mm	
ET -Y, +Z Quadrant	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
ET +Y, +Z Quadrant	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
ET Aft Dome	Horizontal	35-70 mm	
-Z Side of LO_2 T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LO_2 T-); RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
-Z Side of LH_2 T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LH_2 T-0; RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
Overall SSME Cluster	Horizontal	50 mm	-Y Side
SSME No. 2	Horizontal	50 mm	
SSME No. 1, -Z Side	Horizontal	50 mm	
SSME No. 3	Horizontal	50 mm	
Overall SSME Cluster	Horizontal	50 mm	+Y Side
LO_2 UMB Area	Horizontal	35-70 mm	
LH_2 UMB Area	Horizontal	35-70 mm	
ET/ORB UMB & ORB	Horizontal	28 mm	From under ET

Table 80-2 Final Inspection Team - Telephotos
Lower Surface

*** End of Table 80-2 Final Inspection Team - Telephotos ***

Table 80-3 Reduced Final Inspection Team Photos

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 255 FT LVL

Photo	Camera Orientation	Lens	Notes
GO_2 Vent Ducts	TELE	Horizontal	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 215 FT LVL

Photo	Camera Orientation	Lens	Notes
-Y Bipod Ramp	Horizontal	TELE	From RSS
LO_2 P/L Ice/Frost Ramps	Vertical	TELE	From RSS; 2 photos required
GO_2 Seal/Hood	Horizontal	TELE	From RSS
GUCP	Vertical	TELE	
Fwd Half of SSV	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 195 FT LVL

Photo	Camera Orientation	Lens	Notes
-Y Bipod Ramp & Jack Pad C/O's	Horizontal	TELE	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 135 FT LVL

4-1-02

Table 80-3 Reduced Final Inspection Team Photos

Photo	Camera Orientation	Lens	Notes
LH_2 UMB	Horizontal	TELE	
Orbiter Aft Section	Vertical	35-70 mm	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - MLP DECK

Photo	Camera Orientation	Lens	Notes
LH_2 UMB	Horizontal	TELE	From West
ET Aft Dome	Horizontal	TELE	
Aft Hard Point Closeout	Vertical	TELE	
LH_2 Tank	Horizontal	TELE	From North
LO_2 Tank	Horizontal	TELE	From North
LO_2 Tank	Horizontal	TELE	From East
LO_2 F/L Bracket Bellows	Horizontal	TELE	XT - 1978 & XT - 1973
LO_2 F/L Bracket	Horizontal	TELE	XT - 1871
LO_2 F/L Bracket	Horizontal	TELE	XT - 1623
LO_2 F/L Brackets	Horizontal	TELE	XT - 1377 & XT - 1129
LO_2 F/L Brackets & Bellows	Horizontal	TELE	XT - 1129 & XT - 1108; from SE
LO_2 P/L & C/T	Horizontal	TELE	From SE
Overall Orbiter Left Side	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
Overall SSME Cluster -Y Side	Horizontal	28 mm	
Overall SSME Cluster +Y Side	Horizontal	28 mm	

Table 80-3 Reduced Final Inspection Team Photos

ET/Orb UMB & Orbiter Lower Surface	Horizontal	28 mm	From under ET

*** End of Table 80-3 - Reduced Final Inspection Team Photos ***

*** End of Operation **80** ***

4-1-02

OPERATION 90 LO_2/LH_2 Drain Monitoring

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **4.0**

NOTE

This operation is contingent upon progression of launch countdown and is performed after start of cryo (LO_2/LH_2) loading and subsequent launch scrub, FRF, or WCDDT.

Operation Not Performed: ME 08 3-1-02

NOTE

This operation monitors the External Tank external surfaces during LO_2/LH_2 drain operations from time of detanking until 1.5 hours after LO_2/LH_2 low level sensors read dry via OTV 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171.

Noted requirements satisfied by this operation: OMRS S00E00.021

90-1 **Record** start date/time (GMT) of LH_2 and LO_2 Tank Drain.

LH_2 Drain Start Date N/A Time N/A GMT

LO_2 Drain Start Date N/A Time N/A GMT

ETM N/A Date N/A

4-1-0
ET 05

90-2 CVM1 JTV1 223

From start of LO_2 Tank Drain and LH_2 Tank Drain until respective LO_2/LH_2 low level sensors read dry, **monitor** ET external surfaces including LO_2 Feed Line, LH_2 Feed Line, LH_2 Recirculation Line, LH_2 Aft Dome and manhole covers, LH_2/LO_2 Umbilicals, TSM LH_2/LO_2 Umbilicals via OTV cameras. No cryogenic liquid or excessive vapors allowed.

ETM N/A Date N/A

Support: COMM

90-3 **Record** date/time (GMT) when LO_2/LH_2 low level sensors read dry.

LH_2 Sensors Dry Date N/A Time N/A GMT

LO_2 Sensors Dry Date N/A Time N/A GMT

ETM N/A Date N/A

11-1-02

90-4 **CVM1 JTV1 223**

Monitor ET external surfaces including LO_2 Feed Line, LH_2 Feed Line, LH_2 Recirculation Line, LH_2 Aft Dome and manhole covers, LH_2/LO_2 Umbilicals, TSM LH_2/LO_2 Umbilicals via OTV cameras for 1.5 hours after LO_2/LH_2 low level sensors have read dry. No cryogenic liquid or excessive vapors allowed. Record date/time (GMT) when monitoring complete.

LH_2 Complete Date N/A Time N/A GMT

LO_2 Complete Date N/A Time N/A GMT

ETM N/A Date N/A

Support: COMM

90-5 Completion of this operation satisfies noted requirements.

USA 026 OMRSD S00E00.021

90-6 Operation - LO_2/LH_2 Drain Monitoring complete.

*** End of Operation **90** ***

ET 05

4-1-03

OPERATION 100 Console Securing

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **0.5**

100-1

CTIF	**TBC**	**136**
TBC	**CTC**	**232**

OTV support for ET thermal protection system evaluation no longer required.

100-2

CTIF	**JYVR**	**138**

Perform the following:

1. **Turn off** video recorders.
2. **Remove** tape cartridges.
3. OTV support no longer required.

Support: COMM

100-3

CTIF	**CVM1**	**222**
	CVM2	

Secure consoles by setting all monitors to "Off" position.
Report completion.

ET 05

NOTE

Perform next step only after a successful launch.

100-4

CTIF

Remove photo processing laptop computer from Firing Room.

Not Performed: N/A

100-5

CTIF TBC 136
TBC CTC 232

Firing Room 2, ice frost monitoring area securing complete.

100-6

Operation 100 - Console Securing complete.

3-1-02 OR 04

ETM R Brewer Date 3-1-02 3-1-02

*** End of Operation **100** ***

SPC 764 4-1-02
CLARIFICATION

4/4-1-02

OPERATION 110 Summary Tape

Shop: **SE**
Cntrl Rm Console: **FR2**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **18.0**

NOTE
Observations/concerns observed during count are typically recorded on the summary tape real-time (trouble tape).

110-1 **CICE**

After launch or launch scrub, prepare a summary tape to include observations/concerns noted during count.

110-2 Operation Summary Tape complete.

ETM R Brewer Date 3/4/02

*** End of Operation **110** ***

4-1-02
FT
05

OPERATION 120 Post Drain Walkdown

Shop: **SE**
Cntrl Rm Console: **NA**
OPR: **ETM**
Zone: **PAD A/B**
Hazard (Y/N): **Y**
Duration (Hrs): **2.0**

NOTE

Post drain walkdown performed only after start of cryo (LH_2/LO_2) loading and subsequent launch scrub.

Operation Not Performed: ME OB 3-1-02

WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel shall wear **hardhats** and **flame retardant coveralls** while performing post drain walkdown.

NOTE

Post drain walkdown typically commences approximately 1.5 hours after LH_2/LO_2 low level sensors read dry.

Post drain walkdown performed in support of a 24 hour scrub turnaround is typically coincident with the L-20 hour pre-launch walkdown for the ensuing launch attempt.

4-1-02 ET CB

NOTE
NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(4)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(1)
SFOC Safety	(1)

120-1 NASA Lead ET Mechanical Systems Engineer (PH-H) verify essential personnel on station, properly attired, and ready to proceed with post drain walkdown.

Essential Personnel	
NASA Engineering (PH-H)	1
SFOC Engineering (ETM)	1

NOTE
"Hands-on Investigation" is applicable only to those areas which are not understood or fully defined and which cannot be adequately evaluated otherwise.

120-2 **Perform** post drain walkdown as follows:

1. **Visually inspect** ET TPS exterior surfaces after detanking and warm-up (approximately T + 4 hours after drain is initiated) from the MLP, FSS, and RSS as access permits.

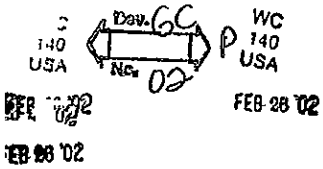
2. **Perform** hands-on investigation of all areas suspected of violating Doc: NSTS 08303 (LI) NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA (LI)

3. Photograph any vehicle / facility concerns observed.
OMRSD S00E00.031

SPC No: N/A
Disc / Frame Nos: N/A

4-1-02

120-3 Walkdown complete. All discrepancies identified. No constraints to continue. Forward description(s) of debris found to SFOC QC for entry into Processing Debris /FOD Database.



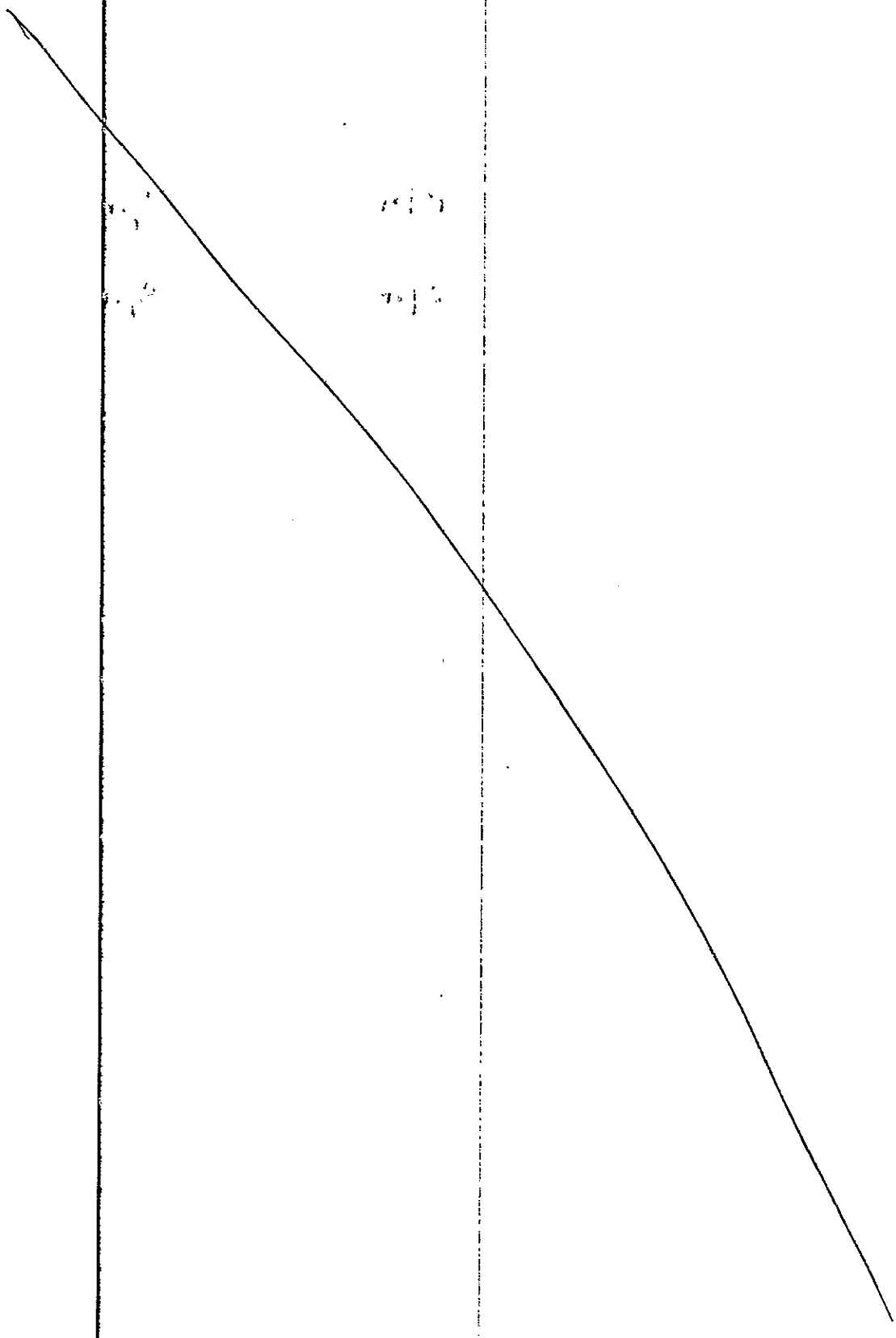
PH-H N/A Date N/A

ETM N/A Date N/A

120-4 Operation Post Drain Walkdown complete.

*** End of Operation 120 ***

6-1-02



AY-1-02

01-09-2002
APPROVED

OMI S6444 J03
APPROVED

OPERATION 130 Post Launch Walkdown

Shop: **SE**
Cntrl Rm Console: **NA**
OPR: **ETM**
Zone: **PAD A/B**
Hazard (Y/N): **Y**
Duration (Hrs): **3.0**

NOTE
Do not perform this operation after launch scrub.

Operation Not Performed: N/A

WARNING
Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel participating in walkdown shall wear **hardhats** and **flame retardant coveralls**.

NOTE
NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(3)	Pad Mgmt Rep (1)
SFOC Engr	(2)	
LMSSC-LSS	(1)	
Boeing LSS	(2)	
SRB ELE	(1)	
Thiokol-LSS	(1)	
SFOC Safety	(1)	

WC 140 USA FEB 28 '02 — No. 130 — No. 01 — WC 140 USA FEB 28 '02

130-1 NASA (PH-H) **verify** following personnel on station, properly attired, and ready to proceed with post launch walkdown.

Essential Personnel		
NASA	PH-H	1
SFOC	ETM	1

NOTE

Post Launch Walkdown must be performed prior to washdown and Pad being opened for normal work.

130-2 **Perform** Post Launch Walkdown as follows:

1. Ref Table 130-1, **visually inspect** post launch pad/area to identify any lost flight or ground systems hardware and debris sources.

2. Ref Table 130-2, **document/SIMS photograph** launch PAD area configuration.

WC 140 USA FEB 28 '02 Dev. GC No. 01 WC 140 USA FEB 28 '02

Description: Post Launch Walkdown SFC No: 51156

DISC/FRAME NOS: 1-28

OMRSD S00U00.010-1 USA 010

130-3 Walkdown complete. Debris sources and lost flight hardware identified. No constraints to continue. Forward description(s) of debris found to SFOC QC for entry into Processing Debris/FOD Database

WC 140 USA FEB 28 '02 GC No. 02 WC 140 USA FEB 28 '02

PH-H Robert Speece Date 3-1-02

ETM J. Blue Date 3-1-02

ET 05 6-28-02 10 25

130-4 Operation - Post Launch Walkdown complete.

6-28-02 1-1-02

Table 130-1 Post Launch Walkdown Inspection Areas

Record mission info, PAD, date, and time:

STS 109 PAD A

Date 3-1-02 Time 0800

SRB Hold-down posts (HDP)

Inspect for damage, stud hang-up Epon shim material, ordnance fragments, doghouse blast covers, erosion, missing hardware, debris. Record Results:

- NO STUD HANG UPS
- NO MISSING HARDWARE ON HDP (8)

MLP Deck

SRB aft skirt purge lines
SRB T-0 umbilicals
Tail service masts (TSM's)
MLP deck

195 Ft Level

Orbiter access arm (OAA)

4-1-02

Table 130-1 Post Launch Walkdown Inspection Areas

215 Ft Level - GH2 Vent Line/GUCP

Latch position
Loose cables
Damage from SRB plume
Damage to the QD

255 Ft Level - GO_2 Vent Arm, Ducts, Hood

Seals
Hood windows, doors, latches

Fixed Service Structure (FSS)

Cable tray covers
Signs
Hydraulic leaks
Slidewire baskets

PAD Apron/Acreage

Vehicle hardware and/or flight TPS materials
Facility debris

Table K-1 PAD Apron/Acreage Items

Description	Location
MINOR DEBRIS FOUND IN PAD APRON	

*** End of Table 130-1 - Post Launch Walkdown Inspection Areas ***

4-1-02

Table 130-2 Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage)

MLP 0-level

1 Ea HDP No. 1, 2, 5 & 6 (HDP shoe and Epon shim)
1 Ea HDP No. 3, 4, 7 & 8 (blast cover down to HDP base)
1 Ea SRB T-O umbilical
1 Ea overall view SRB exhaust cutouts\

Any unusual or debris-related damage to the facility; sound suppression water pipes, TSM's cracks in MLP deck, witness panels, handrails, etc.

Any flight hardware debris (tiles, SRB ordnance fragments)
Any facility debris (nuts, bolts, cable tray covers, etc.)

FSS

Close-ups of GUCP and latching mechanism
Overall views of GO_2 vent hood/ducts, if damaged
Any flight hardware or facility debris
Any unusual or debris-related damage to the facility

PAD Apron/PAD Acreage

Any flight hardware or unusual facility debris objects

Any unusual or debris-related damage to the PAD (such as missing brick in the flame trench), perimeter fence, etc.

***** End of Table 130-2 - Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage) *****

*** End of Operation **130** ***

4-1-02

OPERATION 140 Film Review

Shop: SE
Cntrl Rm Console: NA
OPR: ETM
Zone: NA
Hazard (Y/N): N
Duration (Hrs): 15.0

NOTE
This operation may be not performed after launch scrub.

Operation 140 Not Performed: NA

NOTE
Analysis of Pad Debris Inspection Results determines priority for film review. All critical film (as determined by the Debris Team) must be reviewed as soon as possible after launch and no later than 36 hours prior to entry (of the Orbiter into the earth's atmosphere).

140-1 **Review** and **analyze** all engineering launch (and flight) film to:

- Identify any debris damage to the SSV
- Identify flight vehicle or ground system damage that could affect Orbiter flight operations of future SSV launches.

OMRSD S00U00.011-1

USA VM 011

ETM R Brewer Date 3/4/02

140-2 Operation - Film Review complete.

ETM R Brewer Date 3/4/02

*** End of Operation **140** ***

4-1-02

OPERATION 145 IR Camera Removal

Shop: **PH-H**
Cntrl Rm Console: **NA**
OPR: **ETM**
Zone: **NA**
Hazard (Y/N): **N**
Duration (Hrs): **2.0**

WARNING
Hard hats required on the Pad when SSV is not present.

CAUTION
Exercise care to avoid dropping equipment, fasteners, etc from RSS roof to prevent damage to equipment or injury to personnel. All tools must be tethered.

NOTE
IR Camera removal from RSS Roof site may be not performed in launch scrub turnaround scenarios.

145-1 **Remove** IR camera at RSS Roof Site as follows.

1. **Remove** fasteners (2 pl) from camera housing front. **Retain** fasteners for reinstallation when front cover is installed.

2. **Install** camera housing front cover using previously removed fasteners (2 pl). **Tighten** fasteners (2 pl) wrench tight.

4-1-02
ET 05

WARNING

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

CAUTION

Do NOT allow back cover to exert undue force on cables when opening/rotating back cover.

3. **Rotate** camera housing back cover into open position by removing bolts with flat washers (20 pl). **Retain** bolts/washers for reinstalllation.

4. **Disconnect:**
   - Power cable
   - Pan & tilt cable
   - Controller cable
   - OTV coaxial cable

5. **Unlock** spring pin at lower, left to release IR camera Unit in camera housing. **Remove** IR Camera Unit from camera housing by carefully sliding it out the back opening of the camera housing. **Support** IR Camera Unit during removal.

6. **Rotate** camera housing back cover into closed position. Do not pinch cables. **Secure** back cover by reinstalling bolts/flat washers (20 pl). **Tighten** bolts wrench tight.

4-1-02

WARNING

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

7. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol .

8. **Route** IR Camera Unit to VAB 3K1 for refurb/checkout.

NASA PH-H M. PAYNE Date 3/8/02

USA ETM R Brewer Date 3/8/02

Not Performed: N/A

4-1-02
ET
05

NOTE

IR Camera removal from Camera Site 2 may be not performed in launch scrub turnaround scenarios.

145-2 **Remove** IR camera from Camera Site 2 as follows.

1. **Remove** bolt(s) from camera housing front. **Retain** bolt(s) for reinstallation when front cover is installed.

2. **Install** camera housing front cover using previously removed bolt(s). **Tighten** bolt(s) wrench tight.

WARNING

Power cable is live. Care should be exercised when connecting power cable to avoid electric shock.

CAUTION

Do NOT allow back cover to exert undue force on cables when opening/rotating back cover.

3. **Loosen** screws (8 pl) securing camera housing back cover using Phillips screwdriver. **Rotate** camera housing back cover to open position. **Retain** bolts/washers for reinstallation.

4. **Disconnect:**
   - Power cable
   - Pan & tilt cable
   - Controller cable (2 pl)
   - OTV coaxial cable

5. **Unscrew** set screw(s) at lower, left/right to release IR camera Unit in camera housing. **Remove** IR camera Unit from camera housing by carefully sliding it out the back opening of the camera housing. **Support** IR camera Unit during removal.

6. **Coat** camera housing back cover O-ring with a single coat of (1) tube/jar 6505-00-133-8025 Petroleum Jelly, Vaseline (or equivalent) .

4-1-02

7. **Rotate** camera housing back cover into closed position. Do not pinch cables. **Secure** back cover by installing screws (8 pl). **Tighten** screws wrench tight using Phillips screwdriver.

WARNING

Isopropyl Alcohol is flammable and is a skin, eye and respiratory tract irritant that affects the central nervous system. Ensure adequate ventilation, avoid inhalation of vapors and do not use near heat, sparks or open flame. Skin contact may cause redness and pain eye contact will cause severe eye irritation and may result in permanent damage. Inhalation of vapors in high concentrations has a narcotic effect on the central nervous system. Personnel shall wear **N-Dex nitril gloves** and **chemical splash goggles**. When working at eye level or above wear a **face shield** over goggles.

WS002.a 05-22-01

8. **Clean** IR Camera Unit lens plate using (1) roll 8305-00-519-3144 Rymple cloth dampened with (4) ounces 6810-00-543-7915 Isopropyl alcohol .

9. **Route** IR Camera Unit to VAB 3K1 for refurb/checkout.

NASA PH-H M. PAYNE Date 3/08/02

USA ETM R Brewer Date 3/08/02

Not Performed: N/A

*** End of Operation **145** ***

4-1-02

OPERATION 150 Final Report

Shop: SE
Cntrl Rm Console: NA
OPR: ETM
Zone: NA
Hazard (Y/N): N
Duration (Hrs): **0.5**

NOTE
This operation may be not performed after launch scrub.

Operation 150 Not Performed: NA

150-1 Assemble final report by attaching following reports to this OMI. Reference each to this step.

Post Launch PAD Assessment
SRB Assessment
Launch Film Review
Launch Day Video Review
Orbiter Landing Assessment
ET Separation Review

150-2 Final report assembly complete.

ETM R Brewer Date 04-01-02

150-3 Operation - Final Report complete.

*** End of Operation **150** ***

4-1-02
ET 05

OMI-S6444 - Op. 150-1 Page 1 of 1

STS-109 PRE-LAUNCH PAD DEBRIS INSPECTION REPORT
KSC Debris Team
27 February 2002

The pre-launch inspection of the MLP-2, Pad A FSS and RSS was conducted on 27 February 2002 from 0645 to 0930 hrs EDT.

No facility items were documented in Appendix K of S0007VL4. Minor clean-up items were in-work.

Two vehicle IPR's were generated:

-- IPR109V-405 Two areas of damaged External Tank foam on the LO2 Tank. One area is located at Xt-760, approximately 39 degrees +Y of the +Z axis. The other is located at Xt-600, approximately 31 degrees -Y of the +Z axis. Assesment is in-work. Current plan is to use-as-is.

-- IPR109V-408 Small deposit of RTV-133 on the -Z side of LH SRB forward center segment. (approx. location Xb-1060).
Current plan is to use-as-is.

Armando Oliu
NASA Ice/Debris Team
321-861-3644

OMI-S6441-OP.150-1 Page 1 of 1

STS-109 LAUNCH DAY VIDEO REVIEW
KSC Photo/Video Analysis Team
1 March 2002

Significant Anomalies

None

Minor Anomalies

None.

Funnies

Shortly after SRB separation, particle was observed moving past SSME Cluster (TV-13). Due to video quality, it was difficult to determine the particle type and origin. More detailed analysis will be performed from high speed films.

Observations

Particles (possibly forward RCS paper cover) observed moving past vertical stabilizer just prior to plume recirculation (TV-13).

Bird observed in field of view casting a shadow on the ET Ogive (OTV 071), but was identified not to be in close proximity to the vehicle (TV-4A).

Small particle was observed falling on the +Z side of RH wing during SSME ignition. No contact with Orbiter observed (OTV 054).

Free burning hydrogen was visible near the vertical stabilizer (OTV 070, 041, 051, TV-7A, TV-21).

Numerous pieces of ice from the ET/ORB umbilical shook loose and contacted umbilical sill tiles, but no damage was detected (OTV 009, 054, 063).

LH2 and LO2 T-0 umbilical disconnect was normal (OTV 049, 050).

Frost was visible around –Y and +Y ET GOX vent louver (OTV 060, 061).

Pieces of aft skirt instafoam fell out of the SRB plume during flight (TV-4A).

Notes

A total of 19 videos were made available for review.

Review of long range tracking films is scheduled to begin Saturday, March 2, 2002.

Armando Oliu
NASA – KSC

Abdi Khodadoust
Boeing - Huntington Beach

Carlos Ortiz
Boeing – Huntington Beach

OMI-$6444-OP 150-1 Page 1 of 2

STS-109 POST LAUNCH FILM REVIEW
KSC Photo/Video Analysis Team
2 March 2002

Significant Anomalies

None

Minor Anomalies

None

Funnies

None

Observations

Cloud cover intermittently obscured view shortly after roll maneuver on many cameras. As a result, no data was available to further analyze the item noted as a "funnie" in the Post-Launch Video review.

GUCP separation and retraction appeared normal (E-33, E-34). GH2 vent line contacted deceleration cable south of center. Latch mechanism hit the North stabilizer rod initially and came to rest adjacent to the South stabilizer rod. Positive capture was achieved on the vent line latch. (E-39, E-43)

Vapors visible from flex hose support block web area. Most likely caused by moisture on structure. (E-36)

Vapor trail was observed off of wing tips during and after roll maneuver. (E-52, E-207, E-213, E-222, E-223, E-224)

SRB water trough baggie material was noted exiting the RH SRB exhaust hole. (E-36)

Several birds came into field of view after SSME startup. No contact with vehicle was noted. (E-63, E-77, E-224)

SRB separation appeared normal. (E-207, E-208, E-212)

SSME Mach diamond formation sequence was 3-2-1 (E-76, -77)

Free-burning GH2 blown toward vertical stabilizer by wind. (E-52, E-63, E-76, E-77)

Particles of SRB aft-skirt instafoam fell along side the SRB plume during ascent. (E-207, E-212)

Body flap movement during ascent was typical. (E-207, E-212, E-220)

Ice particles fell from ET/ORB umbilicals after lift-off. No impact to orbiter lower surface was noted. (E-31, E-34, E-36, E-52, E-63)

Charring on the ET aft dome was typical. (E-208, E-212, E-222, E-223)

Umbilical purge barrier baggie material fell during roll maneuver. (E-213, E-222)

Forward RCS paper covers were observed falling aft during early ascent. (E-207, E-223)

Pieces of facility debris entered field of view during liftoff, no vehicle impacts. (E-31, E-36, E-40).

Small ice particles from the flight-half of GH2 vent were observed falling alongside the –Z side of the ET shortly after T-0. (E-207)

North Hydrogen Burn Igniters on LH2 TSM sputtered momentarily. (E-76)

Throat plug material ejected from SRB exhaust hole after T-0. No contact with vehicle. (E-52)

Ice from LO2 feedline bellows or support bracket seen falling between ET and Orbiter. No contact with orbiter noted. (E-52)

RTV noted on LH SRB during L-24 hour inspection was still intact after T-0. (E-33)

Several flashes in SSME plume were observed during ascent. (E-222, E-223)

Notes

Review of high-speed films will continue on Monday, March 4, 2002.

Armando Oliu
NASA – KSC

Robert Speece
NASA – KSC

Abdi Khodadoust
Boeing-Huntington Beach

Carlos Oritz
Boeing-Huntington Beach

OMI- $6444- Op. 150-1 Page 1 of 2

STS-109 POST LAUNCH FILM REVIEW
KSC Photo/Video Analysis Team
4 March 2002

SIGNIFICANT ANOMALIES

None.

MINOR ANOMALIES

None.

FUNNIES

None.

OBSERVATIONS

No stud hang up were observed on any of the SRB hold-down posts.

One small particle fell from each of HDP #2 and #4 DCS/stud hole. (E-8, E-12)

SRB holddown post shoe rocked slightly on HDP's #1, #2, and #6. (E-8, E-9, E-13)

GH2 vent line retraction appeared normal. No rebound observed from the pivot arm assembly. (E-41, E-42, E-61)

No OMS pod flexing observed. (E-17, E-18)

Deluge water pipe leaking near HDP 8. (E-16)

GSE Tile shim material shaken loose by SSME ignition acoustics/vibration from the base heat shield near SSME #1. GMT 11:21:59.349 (E-20)

Tile surface coating material was lost from aft face of LH OMS RCS stinger and several from base heat shield. This is a common occurrence due to SSME ignition acoustics.

Free-burning GH2 blown toward vertical stabilizer during SSME ignition.

Several ice particles fell from ET/ORB umbilicals during SSME ignition.

Vapors on ET aft dome and SRB stiffener rings were observed after T-0.

Ice particles fell from LH2 / LO2 TSM T-0 disconnects.

SRB throat plug material ejected from exhaust hole. No contact with vehicle.

Umbilical purge barrier baggie material fell shortly after T-0. (E-6, E-62)

NOTES

All film items, except for E-204, have been reviewed. E-204 will be reviewed upon its arrival.

No anomalies were observed in the films and videos that would be a concern for re-entry and landing.

Armando Oliu
NASA – KSC

OMI-S6444-OP:150-1 Page 1 of 2

STS-109 ON-ORBIT FILM SUMMARY
KSC Photo/Video Analysis Team
19 March 2002

The last film/video data, 35mm still images from the LO2 ET/ORB umbilical camera, 16mm motion picture with 5mm and 10mm lens and Crew Hand-Held Still Images and video, of the External Tank after separation from the Orbiter were received and reviewed at KSC on 19 March 2002.

SIGNIFICANT ANOMALIES

None.

MINOR ANOMALIES

None.

FUNNIES

None.

Observations:

SRB separation from the External Tank appeared nominal.

ET separation from the Orbiter was normal. The EO-3 separation bolt appeared to be very slightly protruded.

No damage was detected on the LO2 ET/ORB umbilical disconnect, sealing surfaces, or closeout TPS. Typical ablation and divoting was noted on the vertical portion of the umbilical cable tray.

There was an approximately 20 inches by 30 inches of foam loss/erosion on the –Y thrust strut.

Small TPS blisters or shallow divots on the +Y thrust strut. Largest area near the +Y thrust strut flange.

Two small divots near the +Y thrust panel on the intertank to LH2 tank flange.

Three divots observed on the intertank-to-LH2 tank flange between the bipods. One of the divots extends into the acreage foam.

No anomalies were detected in the LO2 tank acreage. The BSM burn scars were typical. The Ogive and the nose cone appeared be in excellent condition

The ablation/erosion of LO2 feedline flange closeouts was typical. Plug pull repairs on the feedline looked good.

Armando Oliu
NASA - KSC

```
**************************************************
*                                                *
*        PROGRAM PRA120 SELECTION CRITERIA       *
* ---------------------------------------------- *
*                                                *
*        RPT TYPE: IPR                           *
*                                                *
*        PR GROUP:                               *
*                                                *
*    WORK AREA CD:                               *
*                                                *
*      PR ELEM CD:                               *
*                                                *
*          STS NO: 107V                          *
*                                                *
* Starting RPT DT: 02/08/02                      *
*                                                *
*   Ending RPT DT: 06/04/02                      *
*                                                *
*  LRU or Non-LRU: B                             *
*                                                *
*    PRACA EFF CD:                               *
*                                                *
*            EICN:                               *
*                                                *
*      RPT STATUS: OP                            *
*                                                *
* DETECTED DURING: S6444                         *
*                                                *
* ---------------------------------------------- *
* Sorted by DETECTED DURING, PR ELEM CD, and EICN *
*                                                *
**************************************************
```

****
*
* NO DATA FOUND ON THE DATABASE FOR THE SELECTED PARAMETERS *
*
****

****
*
* END OF REPORT *
*

DEVIATION INDEX

☒ PERMANENT ☐ TEMPORARY ☐ TEMP - RECYCLE

WAD NO. S64H4-J03

TASK NO./SEQ. NO. Global

DEV NO.	SEQ/ STEP	EFFECTIVITY	QC/ PP&C	DATE	REMARKS
GC/01	30-2	STS109	WC 140 USA	FEB 28 '02	
GC/02	30-3	STS109	WC 140 USA	FEB 28 '02	

6-28

WC
140
USA

USA United Space Alliance

[redacted]

TOP/WAD Deviation

DILS: 95330

Dev No.	DILS No.	Page 1 of 1
GC/01	~~94063~~ (S)	

TOP/WAD No.	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason (10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite)
S6444	~~J02~~ J03 ①	[X] In Family [ ] Out of Family [X] NMA	E	20

First Use Effectivity: [ ] SRB BI- [ ] ET [ ] GSE [X] STS-109 [ ] ORB /FLT [ ] FRCS/POD /FLT [ ] SSME /FLT

Affected: [ ] OMRS/ACOMC/OMP [ ] Design Req'ts [ ] Haz Step(s) [ ] PPE [X] Internal Review Req.

Contractor OPR: R. Seale ETM 1/11/02	Contractor Test Conductor: G. Gross OTC 1/11/02	Gov't OPR: [signature] 1/14/02
Contractor Test Project Engineer: [signature] (Walkins) 1-11-02	Other: Tony Ford USA# E7772 1-11-02	Gov't Project Engineer
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC: Jeff [signature] NTD 1/11/02

Global Change

Page Number	Step Number
30-2	30-1 s/s 4
80-7	80-2 s/s 2
130-2	130-2 s/s 2

Add the following:

SPC No: ______

Disc / Frame Nos: ______

Reason: Ensure traceability and preservation of L-20 Hour, Final Inspection, and Post Launch walkdown photo's.

Originator (print)	SPDMS ID	Phone	Organization	Date	
R. Seale	T08011	1-3348	ETM	1/11/02	[X] Perm [ ] Temp [ ] Temp-Recycle

USA FORM 4-30A

① Change J02 to J03 R. Brewer ET Eng. 2/26/02

ET 05

USA
United Space Alliance

WC 140 USA

TOP/WAD Deviation DILS 95331

Dev No. GC/02 | DILS No. 94064(3) | Page 1 of 1

FEB 28 '02

TOP/WAD No.	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite
S6444	~~J02~~ J03 ①	☐ In Family ☒ Out of Family ☒ NMA	E	20

First Use Effectivity: ☐ SRB BI- ☐ ET ☐ GSE ☒ STS-109 ☐ ORB /FLT ☐ FRCS/POD /FLT ☐ SSME /FLT

Affected: ☐ OMRS/ACOMC/OMP ☐ Design Req'ts ☐ Haz Step(s) ☐ PPE ☒ Internal Review Req.

Contractor OPR	Contractor Test Conductor	Gov't OPR
R. Seale ETM 1/11/02	G. Gross OTC 1/11/02	PH-H2 Robert F. [illegible] 1-11-02
Contractor Test/Project Engineer	**Other**	**Gov't Project Engineer**
[illegible] (Walkdown) 1/11/02	USA ETMZ Tom Ford 1/11/02	
Contractor Safety	**Other**	**Gov't Test Director or Contractor Chief TC**
		Jeff Scanlly NTD 1/11/02

① Change J02 to J03
⊛ R Brewer ET Eng. 2/26/02

Global Change	
Page Number	**Step Number**
30-3	30-2
80-8	80-3
120-3	120-3
130-~~3~~2 ⊛	130-3

Add the following:

Forward description(s) of debris found to SFOC QC for entry into Processing Debris / FOD Database.

Reason: Ensure debris items found during walkdown are entered into appropriate Processing Debris / FOD Database.

Originator (print)	SPDMS ID	Phone	Organization	Date	
R. Seale	T08011	1-3348	ETM	1/11/02	☒ Perm ☐ Temp ☐ Temp-Recycle

USA FORM 4-30A

6-2

DEVIATION INDEX

WAD NO.

☒ PERMANENT ☐ TEMPORARY ☐ TEMP RECYCLE

S6444 REV: J CHG:03 (OMI)

DATE/TIME: 01/25/2002 08:49:11

TASK NO./SEQ. NO. 50

DEV NO.	SEQ/ STEP	EFFECTIVITY	QC/ PP&C	DATE	REMARKS
50-01	50 19		*	2002-01-25	

United Space Alliance

TOP/WAD Deviation

Dev No. 50/01	DILS No. 94394 (3)	Page 1 of 41

TOP/WAD No.	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite
S6444	J03 Richards Verified 1-25-02	☐ In Family ☒ Out of Family	E	30

First Use ☐ SRB BI- ☐ ET ☐ GSE ☒ STS-109

Effectivity: ☐ ORB /FLT ☐ FRCS/POD /FLT ☐ SSME /FLT

Affected: ☒ OMRS/ACOMC/OMP ☐ Design Req'ts ☐ Haz Step(s) ☐ PPE ☒ Internal Review Req.

Contractor OPR	Contractor Test Conductor	Gov't OPR
R. Seale (1) ETM 1/15/02		DH-A2 2-28-02
Contractor Test Project Engineer	Other ~~SE CHECK~~ ETM 1-15-02	Gov't Project Engineer
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC

Page Number: 50-10 Step Number: 50-19

Add step 50-19.1 as follows:

Richards Verified 1-16-02

50-19.1 CTIF ~~CIPC~~ (1) 222

Start continuous recording per Table 50-1 at pick-up of T-9 Minute count including following events:

- **T-7M30S** OAA retraction on camera OTV 008/108 or 042/142.
- **T-3M55S** Orbiter elevon movement on OTV 009/109, 054/154, 063/163, 064/164.
- **T-2M30S** GOX Vent Seal retraction, +Y / -Y GOX Vent Louvers, and GOX Vent Seal Footprints on OTV 013/113, 060/160, 061/161, 062/162, 068/168, and 069/169.
- **T-1M00S** through last view of vehicle during ascent on NASA Select (channel 179).

ME 08

ETM: _____ Date: 3-1-02

Not Performed: N/A

Reason: Ensure critical events are recorded via real-time VCR.

Originator (print)	SPDMS ID	Phone	Organization	Date	
R. Seale	T08011	1-3348	ETM	1/15/02	☒ Perm ☐ Temp ☐ Temp-Recycle

2/28

DEVIATION INDEX

☒ PERMANENT ☐ TEMPORARY ☐ TEMP - RECYCLE

WAD NO. S64444-J03

TASK NO./SEQ. NO. 120

DEV NO.	SEQ/ STEP	EFFECTIVITY	QC/ PP&C	DATE	REMARKS
120/01	120-2	STS-109	~~WC~~ 140 USA	FEB 28 '02	

6-28-02
LE/81

USA
United Space Alliance

Dal/No 120/01 OR 04 1-11-02

TOP/WAD Deviation

DILS 95332

Dev No. 120/01	DILS No. 94065	Page 1 of 1

TOP/WAD No	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite
S6444	~~J02~~ J03	☐ In Family ☒ Out of Family ☒ NMA	E	20

First Use Effectivity: ☐ SRB BI- ☐ ORB /FLT ☐ ET ☐ GSE ☐ FRCS/POD /FLT ☒ STS-109 ☐ SSME /FLT

Affected: ☐ OMRS/ACOMC/OMP ☐ Design Req'ts ☐ Haz Step(s) ☐ PPE ☒ Internal Review Req.

Contractor OPR	Contractor Test Conductor	Gov't OPR
R. Seale ETM 1/11/02	G Gross OTC 1/11/02	PH-H2 1-11-02
Contractor Test Project Engineer	**Other**	**Gov't Project Engineer**
(WALKING) 1-11-02	Tom Ford USA ETM2 1-11-02	
Contractor Safety	**Other**	**Gov't Test Director or Contractor Chief TC**
		Jeff Spaulding NTD 1/11/02

Page Number: 120-2 Step Number: 120-2

Add the following as s/s 3

3. **Photograph** any vehicle / facility concerns observed. (NONE) ET 05

SPC No: N/A

Disc / Frame Nos: N/A

Reason: Ensure traceability and preservation of Post Drain walkdown photo's.

Originator (print)	SPDMS ID	Phone	Organization	Date	
R. Seale	T08011	1-3348	ETM	1/11/02	☒ Perm ☐ Temp ☐ Temp-Recycle

USA FORM 4-30A

OC Change J02 to J03 R Brewer ET Eng 02/12/02

DEVIATION INDEX

☒ PERMANENT ☐ TEMPORARY ☐ TEMP - RECYCLE

WAD NO. S6444-J03

TASK NO./SEQ. NO. 130

DEV NO.	SEQ/ STEP	EFFECTIVITY	QC/ PP&C	DATE	REMARKS
130/01	130-1	STS109	WC 140 USA	FEB 28 '02	

SPC 765

USA
United Space Alliance

TOP/WAD Deviation DILS: 95333

Dev No. 130/01	DILS No. 94097(s)	Page 1 of 1

TOP/WAD No.	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite
S6444	~~J02~~ (1) J03	[X] In Family [ ] Out of Family [X] NMA	E	20

First Use Effectivity: [ ] SRB BI- [ ] ET [ ] GSE [X] STS-109 [ ] ORB /FLT [ ] FRCS/POD /FLT [ ] SSME /FLT

Affected: [ ] OMRS/ACOMC/OMP [ ] Design Req'ts [X] Haz Step(s) [ ] PPE [X] Internal Review Req.

Contractor OPR	Contractor Test Conductor	Gov't OPR
R Seale ETM 1/11/02	G Grors OTC 1/11/02	[signature] PH-HC 1/11/02
Contractor Test Project Engineer	Other	Gov't Project Engineer
[signature] (Walkdown) 1-11-02		
Contractor Safety	Other SE check Richards	Gov't Test Director or Contractor Chief TC
Dennis [signature] 1/14/02	[signature] 1/10/02	Jeff Spaulding NTD 1/11/02

(1) Change J02 to J03 R Brewer ET Eng. 02/26/02

Page Number: 130-1 Step Number: 130-1

Add following to list of walkdown participants in 2nd Note on pg 130-1:

Pad Mgmt Rep (1)

Reason: Inclusion of personnel from the Pad Management Office will expedite identification and resolution of FOD and facility damage identified during the Post Launch Walkdown.

Originator (print)	SPDMS ID	Phone	Organization	Date	
R. Seale	T08011	1-3348	ETM	1/10/02	[X] Perm [ ] Temp [ ] Temp-Recycle

USA FORM 4-30A

DEVIATION INDEX

☐ PERMANENT ☒ TEMPORARY ☐ TEMP - RECYCLE

WAD NO. S6444-J03

TASK NO./SEQ. NO. 30

DEV NO.	SEQ/ STEP	EFFECTIVITY	QC/ PP&C	DATE	REMARKS
30/01	30-3	109✓102	WC 140 USA	FEB 27 '02	

6-28-0

United Space Alliance

2961786

TOP/WAD Deviation

Dev No. 30-01	DILS No. 95405	Page 1 of 1

TOP/WAD No.	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite
S6444	J03	[X] In Family [ ] Out of Family [ ] NMA	E	20

First Use [ ] SRB BI- [X] ET 112 [ ] GSE [ ] STS-
Effectivity: [ ] ORB /FLT [ ] FRCS/POD /FLT [ ] SSME /FLT

Affected: [ ] OMRS/ACOMC/OMP [ ] Design Req'ts [ ] Haz Step(s) [ ] PPE [ ] Internal Review Req.

Contractor OPR	Contractor Test Conductor	Gov't OPR
R Brewer 02-27-02		
Contractor Test Project Engineer	Other SE Check	Gov't Project Engineer
	Mark Wollum 02-27-02	
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC

Page Number: 30-3 Step Number: 30-3 ✓

Add the following new step:

30-4 **Perform** Pre-launch walkdown, Run no. 2, per Attachment #1.

Originator (print)	SPDMS ID	Phone	Organization	Date	
R. Brewer	ZQ6345	1-4429	ETM	02/27/2002	[ ] Perm [X] Temp [ ] Temp-Recycle

FOR ET 02-3

USA FORM 4-30A

$6444 DEV. NO. 30-01T ATTACHMENT #1, PAGE 1 of 5

OPERATION 30 Pre-launch Walkdown (RUN NO. 2)

Shop: **SE**
Cntrl Rm Console: **NA**
OPR: **ETM**
Zone: **PAD**
Hazard (Y/N): **N**
Duration (Hrs): **2.0**

WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a safety harness with a lanyard secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

NOTE

This operation is performed at approximately L-20 hours. When this operation is performed in support of a 24 hour scrub turnaround, the preceding launch scrub post drain walkdown and this pre-launch walkdown may be performed concurrently.

Inspections may also be performed from the RSS, GO_2 Vent Arm (GVA), -Y OWP, or +Y OWP if still extended and accessible.

Ref: 80901019010 (LI) ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are optional walkdown participants.

NASA Engr	(4)
SFOC Engr	(2)
LMSSC - LSS	(1)
Boeing - LSS	(1)
SRB ELE	(1)
Thiokol - LSS	(1)

R Brewer ETM-SE 02-27-02
M Wallace 2/27/02

2-28-02
ET 05

30-1 Debris inspection team **perform** walkdown of SSV and MLP per following:

1. Team leader **verify** S6444 pre-test briefing complete.

2. **Assemble** following essential personnel

   NASA PH-H Engineering - 1
   SFOC ETM Engineering - 1

3. **Inspect** following areas (as a minimum) from the MLP, RSS and FSS to identify/ resolve potential debris sources.

   Areas to be inspected

   A. Launch vehicle external surfaces

   - Orbiter
   - SRB's
   - External Tank

   B. MLP surfaces

   - LH and RH SRB holddown posts
   - Deck including deck bolts, fixtures, and edge gutters
   - SSME LH and RH SRB exhaust openings, and sound suppression (SS) troughs
   - TSM's and camera housings

4. Ref Table 30-1, **document** and SIM Photograph SSV and Launch PAD Configuration.

   Description: Pre launch walkdown.

   OMRSD S00U00.030-1 (1) SPC NO. 51154 / 51155

   USA VM 026 DIS/FRAME NO. 1-26/1-9

(1) R Brewer ETM-SE 02-27-02
M Wollam 2/27/02

2/28/02

LET

$6444 DEV. NO. 30-01T ATTACHMENT #1, Page 3 of 5

30-2 **Record** all facility discrepancies in S0007. Submit copy to PAD leader and **notify** TBC/CTC. **Verify** no constraints to continue. FORWARD DESCRIPTION OF DEB FOUND TO SFOC QC FOR ENTRY INTO PROCESSING DEBRIS DATA (1)

PH-H _____ Date 2/28/02

ETM _____ Date 2-28-02

30-3 Operation - Pre-launch Walkdown complete.

(1) R Brewer ETM-SE 02-27-02

M Wollam 2/27/02

2-28-02

ET 05

135 Ft Level Photos

Photo	Camera Orientation	Lens	Notes
LO_2 UMB	Vertical	35-70 mm	From OWP usually during T5401
LH_2 UMB	Vertical	35-70 mm	From OWP usually during T5401

215 Ft Level Photos

Photo	Camera Orientation	Lens	Notes
ET surfaces from FSS	Vertical	35-70 mm	
LH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
RH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
Jack Pad C/O's	Horizontal	35-70 mm	Flash needed (1 each C/O)
LO_2 Ogive Cable Tray	Vertical	35-70 mm	From RSS roof

255 Ft Level Photos

Photo	Camera Orientation	Lens	Notes
ET surfaces with GO_2 vent ducts in view	Vertical	35-70 mm	
GO_2 vent ducts	Horizontal	250 mm	

***** End of Table 30-2 Photo Requirements for SSV and Launch Pad Configuration**

*** End of Operation **30** ***

R Brewer GTM-SE 02-27-02

GM Wollam 2/27/02

2-28-02 ET 05

Table 30-1 Photo Requirements for SSV and Launch Pad Configuration			
Photos from MLP			
Photo	**Camera Orientation**	**Lens**	**Notes**
ET -Z	Vertical	28 mm	
Aft Dome	Horizontal	28 mm	
Aft Dome	Horizontal	35-70 mm	
LH SRB from North	Horizontal	35-70 mm	All water troughs in view
LH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
LH SRB from East	Vertical	35-70 mm	
RH SRB from North	Horizontal	35-70 mm	All water troughs in view
RH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
RH SRB from West	Vertical	35-70 mm	
SRB Heater Elec T-0	Horizontal	35-70 mm	Foam intrusion; May need flash
North HDP	Vertical	35-70 mm	Representative view
South HDP	Vertical	35-70 mm	Representative view
TSM T-0 LH_2	Vertical	35-70 mm	Flash needed
TSM T-0 LO_2	Vertical	35-70 mm	Flash needed
Orbiter Left & Right Wing	Vertical	35-70 mm	From below ET (1 Photo each wing)

R Brewer ETM-SE 02-27-02

M Wollam 2/27/02

2-28-02 ET 05

DEVIATION INDEX

☐ PERMANENT ☒ TEMPORARY ☐ TEMP - RECYCLE

WAD NO. S6444-J03

TASK NO./SEQ. NO. 600

DEV NO.	SEQ/ STEP	EFFECTIVITY	QC/ PP&C	DATE	REMARKS
600/01	600-11	STS109/102	WC 140 USA	FEB 26 '02	pg. 600-6 see dev

6-28-05 ET

USA
United Space Alliance

2961786

TOP/WAD Deviation

Dev No. 60-01	DILS No. 95334	Page 1 of 1

TOP/WAD No.	REV/CHG/VER		Cause Code Org (B,D,E,G,H,L,N,O,P,Q,S,T,V)	Cause Code Reason 10-Tech Chg 20-Proc Chg 30-Auth Error 40-Rewrite
S 6444	J03	[X] In Family [ ] Out of Family [ ] NMA	E	20

First Use: [ ] SRB BI- [X] ET 112 [ ] GSE [ ] STS-
Effectivity: [ ] ORB /FLT [ ] FRCS/POD /FLT [ ] SSME /FLT

Affected: [ ] OMRS/ACOMC/OMP [ ] Design Req'ts [ ] Haz Step(s) [ ] PPE [ ] Internal Review Req.

Contractor OPR	Contractor Test Conductor	Gov't OPR
R Brewer 02-26-02		
Contractor Test Project Engineer	Other SE Chief 2-26-02	Gov't Project Engineer
Contractor Safety	Other	Gov't Test Director or Contractor Chief TC

Page Number: 60-6 Step Number: 60-11
Add the following new substep:

60-11.1 At terminal count, position camera no. 10 as shown in figure no. 1. This area is the LH2 Ventline retract haunch.

ETM ME 08 Date 3-1-02

Originator (*print*)	SPDMS ID	Phone	Organization	Date	
R. Brewer	ZQ6345	1-4429	ETM-SE	02/26/2002	[ ] Perm [X] Temp [ ] Temp-Recycle

USA FORM 4-30A

OMI - $ 6444 Dev. No. 60-01T Page 1 of 1
Fig 1

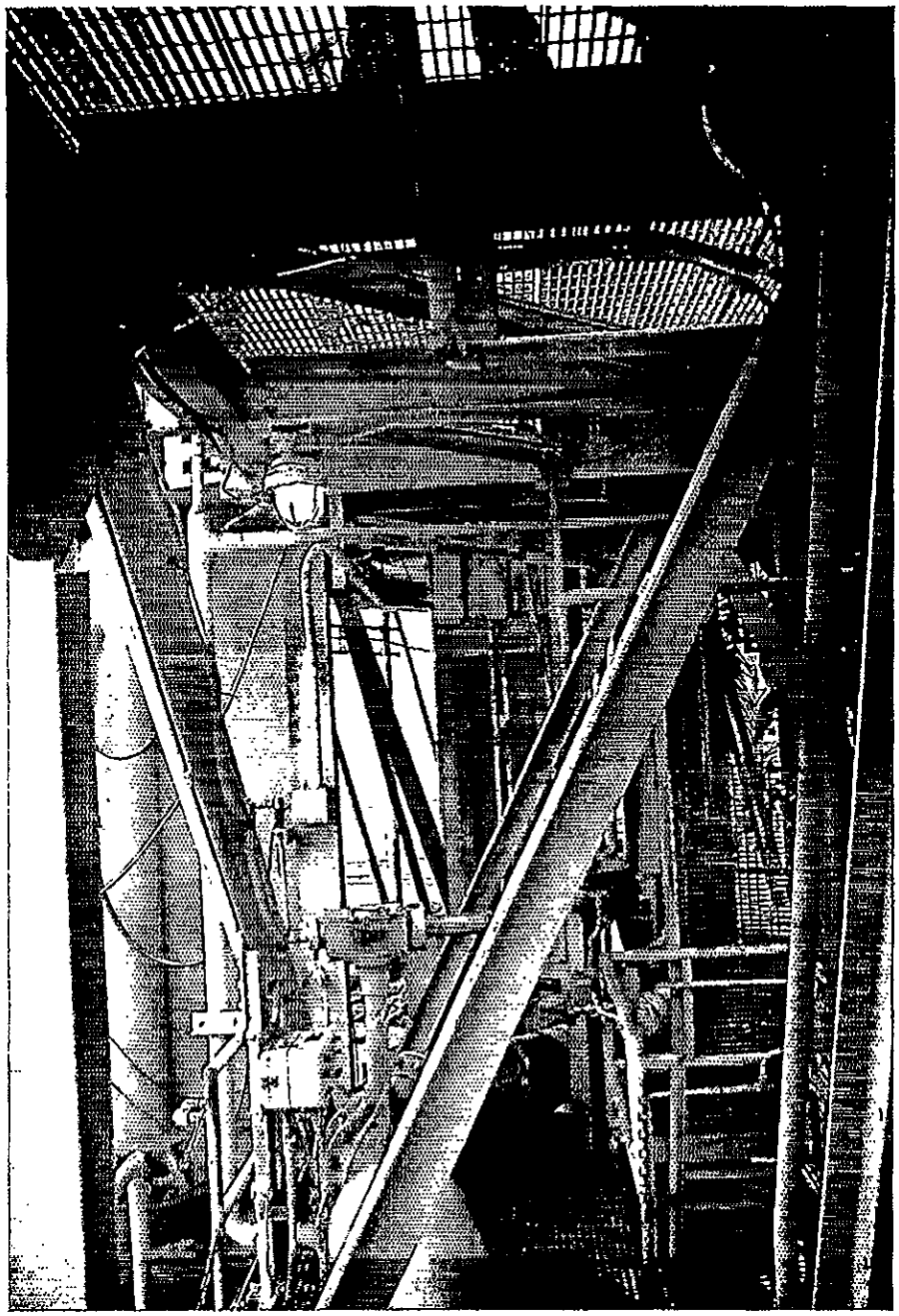


Figure No. 1

L Brewer ETM-SE 02/26/02

ETM-S² 2/26/02

6-28-
IM-1

United Space Alliance

Pen and Ink Change Record

WAD NO./REVISION: S6444 J03

EFFECTIVITY: OV102/028/107V

PAGE	SEQ/OP-STEP	CHANGE	APPROVAL QE/ENG.
		NONE THIS FLOW	